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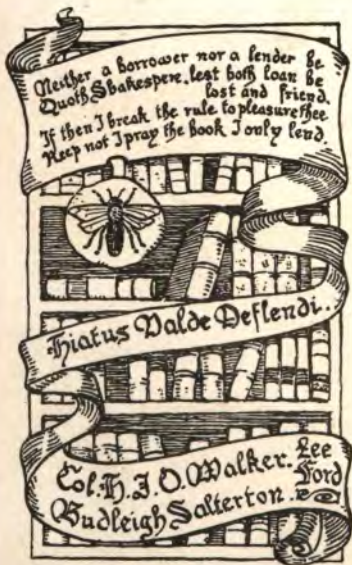
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# MODERN BEE-KEEPING



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# MODERN BEE-KEEPING.



**THE BARONESS BURDETT-COUTTS,**  
*President 1874-1903 of the British Bee-Keepers' Association.*

# MODERN BEE-KEEPING:

A HANDBOOK FOR COTTAGERS.

*NINTH EDITION.*

REVISED AND ENLARGED BY THE COUNCIL OF THE  
BRITISH BEE-KEEPERS' ASSOCIATION.

**Eighty-fifth Thousand.**

PUBLISHED FOR  
THE BRITISH BEE-KEEPERS' ASSOCIATION.  
BY LONGMANS, GREEN & CO., PATERNOSTER ROW,

1903.



**W. WESTON & CO.,  
PRINTERS,  
BUDGE ROW, LONDON, E.C.**

W  
RTYME  
B 777  
1903

THE  
**BRITISH BEE-KEEPERS' ASSOCIATION.**

**INSTITUTED MAY, 1874.**

For the Encouragement, Improvement, and Advancement of  
Bee-Culture in the United Kingdom, particularly as a means  
of bettering the Condition of Cottagers and the Agricultural  
Labouring Classes, as well as the advocacy  
of humanity to the industrious Labourer—  
the Honey Bee.

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## PREFACE.

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SINCE the year 1874 the British Bee-keepers' Association has been working for the benefit of such of the rural population, and especially the cottagers of England, as are, or may become, bee-keepers. Its primary object has been to give information about the nature, habits, and wants of bees, for without such knowledge success in bee-keeping is difficult.

The formation of County Associations affiliated to the Central Association has provided the means, in most of the rural districts, of teaching modern methods of bee-keeping by demonstrations and lectures in the bee-tent at agricultural and horticultural shows, and by the travelling bee-van, and the attentive, wondering audiences have fully justified all efforts made on their behalf. To fix the interest thus aroused the parent society has compiled this small treatise, which, at small cost, supplies all the definite information needed by a beginner in the craft. It is hoped that the successful carrying out of the instructions herein given may create a desire to study standard works on this fascinating subject, and thus to learn more about man's wondrous little insect-helper.

Eight editions of the *Handbook* have been exhausted, and the Council, having again revised the

work, issue this ninth edition, hoping that it will be deemed worthy of a like favourable reception with those that preceded it, and will also promote the object which the Association has always kept in view, viz., the advancement of Bee-culture among the cottagers of the United Kingdom and the increase of the home supply of pure, wholesome food. The Council cordially thank Dr. Percy Sharp, of Brant Broughton; Mr. J. H. Howard, of Holme; Messrs. Meadows & Son, of Syston; and Messrs. J. Lee & Son, of London, for the use of illustrations.

Since the foregoing was in type the British Bee-keepers' Association has received yet another proof of the kindness of their President, the Baroness Burdett-Coutts, in the permission accorded them to place her portrait as frontispiece to this edition: the Council feel assured that the portrait will enhance the value of the book in the eyes of all who are cognisant of the active part taken by her ladyship in the work of the Association from its commencement.

---

# MODERN BEE-KEEPING.

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## I.

### NATURAL HISTORY OF HONEY BEES.

A COMPLETE stock of bees contains a queen, workers, and, in the swarming season, a greater or less number of drones also. The queen is the *mother* bee, as she alone (except in very rare cases) lays all the eggs from which the inhabitants of the hive are produced. Her fertility is remarkable. During spring and early summer she will often deposit from two to three thousand eggs daily, for weeks in succession. The



Fig. 1.—Queen.



Fig. 2.—Drone.



Fig. 3.—Worker

workers,—so called because by them, amid many other duties, the comb is built, the honey is gathered, and the grubs are fed,—are undeveloped females. Occasionally, however, when the hive has lost its queen, a worker will be found so far fertile as to lay eggs, but these always develop into drones. These



latter are the males, and are produced, at the approach of the swarming season, for mating with the young queens and continuing the race. They gather no honey, and are driven from the hive by the workers when their services are no longer required.

Honey-comb (see fig. 16, p. 49) consists of six-sided cells made of wax, which is not gathered, but is a secretion, which exudes in the form of small scales between the rings on the under side of the abdomen of the bee. Five of the smaller cells measure just one inch across, and in these honey and pollen are stored, and worker-bees produced. The larger cells, four to the inch, are the cradles for drones; while the queen-cells, in which the mother-bees are raised, are not unlike acorns in shape, and hang with their mouth downwards, as shown in fig. 16. The eggs, kept warm by the bees, produce tiny white grubs, which hatch out at the end of three days, and are fed upon a half-digested mixture of honey, pollen, and water. The worker-grubs, in from five to six days, become fully grown, and are then covered in (sealed over) by a brownish cap of wax and pollen mixed. Each then changes into a chrysalis or pupa, twelve days more being required to convert this into a perfect bee, which, on the twenty-first day after the egg from which she came was laid, cuts away the sealing which imprisoned her. Drones pass through like changes, but are weaned, on the fourth day, by the addition of undigested pollen, and require twenty-five days to

develop into the perfect insect. Sealed drone-brood may be known by the size of the cells and the projection of the rounded covers (see fig. 16, p. 49).

Bees can raise queens from worker eggs, or from grubs, if the latter are not more than three days old; the only apparent means being, forming a larger cell (see fig. 16a) round the young grub, and giving a special food in greater abundance. The queen, though a more fully developed insect than the worker, arrives at maturity in five days less time, and it is well to remember that she leaves the cell eight days after being sealed in.

The length of a worker's life depends upon the labour she performs. During the hard work of summer it does not exceed two months, but bees hatched in autumn, since they pass the winter in rest, survive well into the following spring.

The queen occasionally lives as long as five years, but usually is worn out in three, and as she is generally most prolific in her second year, it is an important point to secure a succession of queens of that age. When the bees realize that their queen is failing, they begin to take steps for securing a successor, and in due time the old queen is removed. Under ordinary conditions, drones exist only in the spring and summer; but when a stock loses its queen the drones are allowed to live, and even those of other hives are accepted. The presence of drones at unusual times is, therefore, generally a sign of loss of the queen.

Those who desire a further acquaintance with the natural history of the bee will find the Diagrams (with key), published by the Association, of great service and interest.\* (See advertisement.)

## II.—STRAW HIVES, OR SKEPS.

The moveable-comb hive, hereafter described as the frame-hive, offers so many advantages over those with fixed, or immoveable, combs, that the Association is labouring for its introduction among all classes of bee-keepers, and, in consequence, only a short description of straw skeps will here be given. These should be made thicker than is usually the case, and should be flat-topped, rather than dome-shaped, having a large hole in the centre of the crown, to give facilities both for feeding and supering, as explained in subsequent chapters. Arrangements should, also, be provided for enlarging or contracting the entrance. The best size can hardly be stated, since, in very good honey-producing districts, large skeps secure the best results, while, in poor localities, those of less size will be found more profitable; but those in use are generally too small. A suitable average size is 15 inches in diameter and 7 to 9 inches deep. Fig. 27, p. 70, shows such a hive 9 inches deep, partially covered by the super-case, and having a wooden hoop worked on to the lower edge

\* See also 'The Honey Bee,' by T. W. Cowan.

of the skep, with entrance cut in it 6 inches long and  $\frac{3}{8}$  inch deep.

It is very desirable that the floor-board be sound, flat, and circular. If at all larger than the bottom of the skep, the part projecting should be bevelled at the edges, while, if a straw hackle be placed over all, it will look neat, keep the hive dry, and do much to prevent the escape of heat; dryness and warmth are matters of vital importance.

The skep is both cheap and portable, and if made thick and kept dry it affords sufficient protection; but those who use skeps only must not hope to secure profits as large as those within the reach of the bee-keeper intelligently managing frame-hives. It must, also, be remembered that the impossibility of enlarging or reducing the brood-nest, and the difficulty of inspecting combs at will, are permanent objections to the use of the skep, but improved methods adopted are shown in later pages under the headings of "Quieting Bees," "Natural Swarming," "Driving," "Uniting," "Artificial Swarming," &c.

### III.—FRAME-HIVES.

These hives differ from skeps in that the combs built by the bees within them can be, without injury, taken out and replaced at will by the bee-keeper, and on this account they are often called "Moveable-comb Hives." If a stocked skep be ex-

amined, the combs will be found to be built from the roof, each comb being about 1 inch in thickness, with a space between it and its fellow of  $\frac{1}{2}$  inch. In the moveable-comb hive, which may be compared to a box without a lid, frames are so placed as to be free of the sides and bottom. These frames should be made  $\frac{7}{8}$  of an inch wide, and have  $\frac{5}{8}$ -inch space between them, thus making up  $1\frac{1}{2}$  inches from centre to centre, and keeping the combs, when built, in the

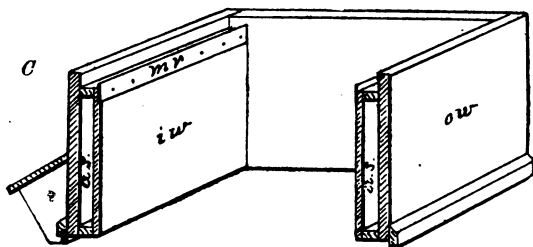


Fig. 4.—Sectional View of Body-box of Frame-Hive.

same natural position with regard to one another as we find them in the skep. To maintain this position, means should be provided for keeping the required distance (see figs. 7-9a, pp. 22-23).

It is always best to get a modern hive as a pattern before beginning to make frame-hives at home. It is also indispensable to the profitable management of such hives that all frames should be interchangeable, so that any one can be removed from any hive with a certainty of its fitting any other hive in use.

The British Bee-keepers' Association has adopted a Standard frame, the outside dimensions of which are 14 inches long by  $8\frac{1}{2}$  inches deep, the top bar being 17 inches long,  $\frac{3}{8}$  of an inch thick, the side bars  $\frac{1}{4}$  of an inch, and bottom bar  $\frac{1}{8}$  of an inch thick, the width being  $\frac{7}{8}$  of an inch. The thickness of the bars may be varied, but the outside dimensions must always remain the same.

The brood-chamber of a hive to take the Standard frame should be 9 inches deep; and if the wood, after planing, is not quite so wide, strips can be nailed on to secure the proper depth, otherwise the frames would nearly reach the bottom board, in which case there will be a chance of crushing bees when the frames are replaced in the hive.

If the frames are to hang, as is best, at right angles to the entrance, the hive should measure  $14\frac{1}{2}$  inches from front to back, inside, which will give room enough for the frame and allow, as passage-way for the bees, the requisite  $\frac{1}{4}$ -inch space, at either end, between it and the hive side. If more space be left, they will build comb in it; if less, they will fasten the parts together with propolis, a resinous substance which they collect from trees.

The hive may be made to take any desired number of frames, but 10 will be usually found to suffice. As each frame, with the space between it and the next, occupies  $1\frac{1}{2}$  inches;  $16\frac{1}{2}$  inches will be required for 10 frames, two  $\frac{1}{2}$ -inch division boards, and two strips

of wood each  $\frac{3}{8}$  by  $\frac{3}{16}$  inch. The division boards are used to enclose the frames, and the strips to increase the distance between the face of the end combs and the division boards.

Fig. 5 gives an outline sketch of a complete frame-hive for general use, with its various sections or parts shown separately. *A* is the floor-board, *B* the body-box or brood-chamber, *C* the rack of sections, *D* the 'lift,' used for the double purpose of raising the roof (*E*) and so covering the sections, and for sliding down over the body-box in winter for warmth and protection from frost. (The "lift" as it appears in the cut is in its winter form. In summer it is reversed, when the ledges of wood, shown on its upper insides, rest on the edge of the body-box.)

To begin, then, with the floor-board—its general form and construction will be readily gathered from the sketch, and it is only needful to say that the bearers (*A*), on which the actual floor of the hive is nailed, are cut from  $1\frac{1}{2}$ -inch boards, and sloped in front as shown. The entrance is formed by the centre portion of floor (*lp*) being lowered  $\frac{3}{4}$  inch as shown, so that the hive-body rests on the projecting lugs (*ff*) at each side of the upper floor. The alighting-board (*ab*) and the lower platform (*lp*) of the floor-board are of  $\frac{1}{2}$ -inch stuff, the floor-board proper (*fb*) being  $\frac{3}{4}$  inch thick.

A sectional view of the body-box (fig. 4) is shown to make clear the way in which the front and back

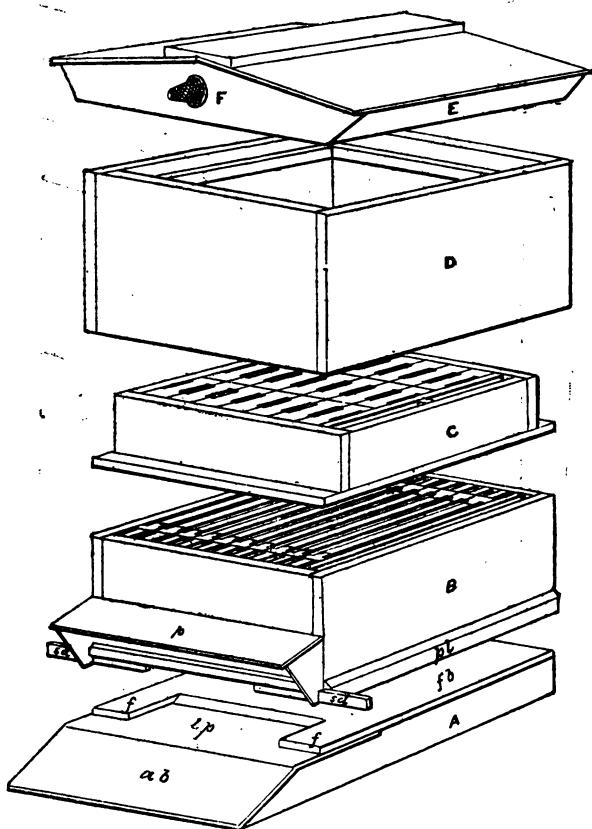
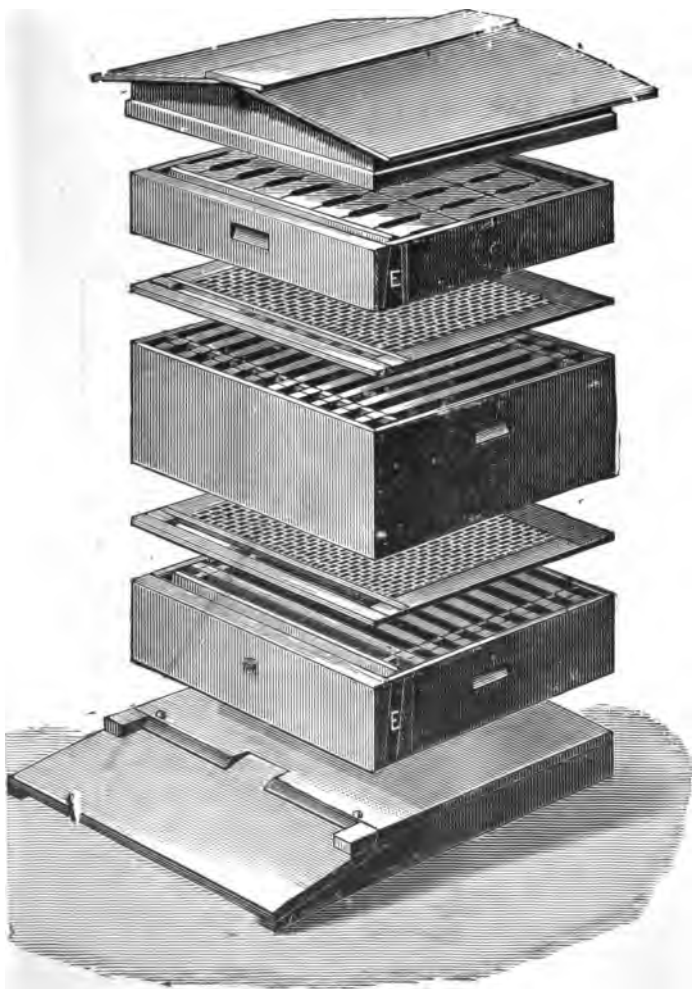


Fig. 5.—Complete Frame-hive.





**Fig. 5a.**—Modern Hive, porch removed, showing position of shallow frames when worked as a Non-swarming Hive.

walls are formed to take the 17-inch top-bars of the Standard frame, as seen in fig. 5. The outer walls (*ow*) are 9 inches high ; the inner (*iw*)  $8\frac{3}{8}$ , but the latter are of lighter boards. Strips of wood nailed along the top and bottom of the two form a confined air-space (*as*), as shown in the diagram. Metal runners (*mr*), on which the frames hang, are nailed to the face of the inner walls, and project above the top edge, so as to raise the upper side of the top-bars level with the outer walls of the hive, and yet allow a bee-space under the frame-ends, to avoid crushing bees.

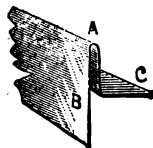


Fig. 6.—Metal Runners for Hive Sides.

Returning to fig. 5, the porch (*p*), which is better made detachable, and the floor-board are so arranged as to provide an entrance into the hive  $\frac{3}{8}$  inch high, and of any width up to 12 inches ; the sliding doors (*sd*) work in a groove formed by notching out the ends of the porch as shown, and fixing a strip of wood (with its lower edge  $\frac{3}{8}$  inch above the floor-board), behind which the sliding doors pass, in a groove made out for the purpose. The plinths (*pl*), fixed to the two sides and back of the body-box, extend half an inch below the junction of the latter with the floor-board to keep out wet. Beyond noting that the upper platform of the floor-board, at the part where it joins the lower platform (*lp*), is chamfered down to form an incline, up which the bees pass, the illus-

tration may be said to explain itself sufficiently to be understood by any amateur joiner. The "cone" of perforated zinc (*P*) fixed over the ventilation hole in the roof is explained later on, p. 26.

The Standard frames must be accurately made, and it is much better to purchase them ready for use, as it is absolutely necessary that all should be exactly the same size, and perfectly rectangular.

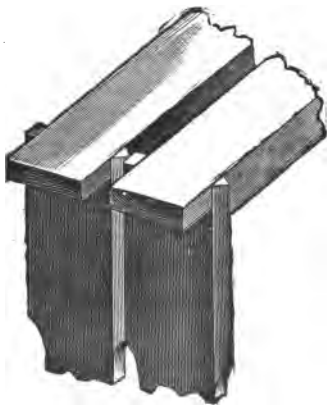


Fig. 7.—"Hoffman" Self-spacing Frame.

It has been mentioned that bees will fix together parts that are very near each other. They, therefore, are apt to fasten down the frame-ends, *A* and *B*, fig. 8, to their resting-places. This is very inconvenient, and may be almost wholly prevented by making the frame-ends (or lugs) rest on metal runners, as shown in fig. 6, or on the edge of a

stout strip of zinc, the back and front of the hive being cut a little lower, as at *mr*, fig. 4, p. 16, to give  $\frac{1}{4}$ -inch space below the "lugs." This also enables the frames to be pushed backwards and forwards on the



Fig. 8.



Fig. 9.  
"W.B.C."  
End.

metal strip with the greatest ease. The correct distances between the frames are best kept by means of metal ends, of which there are several patterns to

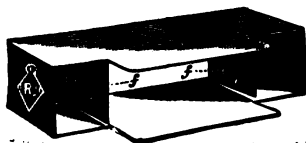


Fig. 9a.—"W.B.C." End.

be had at small cost, but those known as the "W.B.C." ends (fig. 9) are in most general use. They are also shown in position on a complete frame fitted with comb-foundation in fig. 8.

Upon the top surface of the frames is placed what is termed the quilt, that is, a cover of unbleached calico and also three or four thicknesses of cloth, or

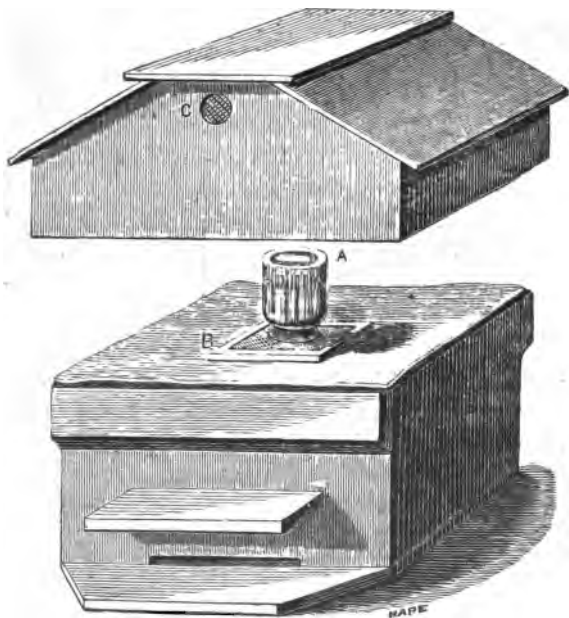


Fig. 10.—Hive, with Quilt, Feeding-bottle, and Super-cover.

something of the kind, to keep in the bees and prevent the escape of heat.

Several plans have been proposed to overcome the difficulty commonly experienced in lifting a frame

from a very full hive; but by making the hive longer than the ten frames require, and inserting two  $\frac{1}{2}$ -inch boards, called *division-boards*, one on each side, and fitting close all round—either of them being removed when examining a hive—space is obtained in which to draw the frames apart before lifting. Any frame can then be taken out without injuring the adhering bees or queen. The latter accident is serious, and every care should be taken to reduce its probability.

If the hive is to stand under cover, it is now nearly complete, but if in the open, it should not only be thoroughly painted on the outside, but it must have some form of roof thoroughly waterproof, for damp is a far greater danger to bees than any ordinary amount of cold. Under this roof space should be provided for racks of sections, boxes, or glasses, all included under the name of “Supers,” which are intended to be filled with comb-honey. The roof may be all in one, as shown in illustration (fig. 10), or made shallow—with the upper and lower parts detached—the latter being used as a “lift” when required. A neat super-cover can be made with a sloping roof, as at fig. 10, which represents a simple, home-made hive, showing the quilt covering the frames, and a feed-bottle standing upon a feeding-stage, as hereafter described under the head “Feeders” (p. 56).

The addition of a hole at each end, one of which is seen at C, fig. 10, covered with perforated zinc, will

give the necessary ventilation during the extreme heat of summer, and make our super-cover complete. If, in place of the perforated zinc, a cone super-clearer is used (fig. 5, *F'*), not only will ventilation be secured, but any bees becoming imprisoned in the roof will be enabled to escape.

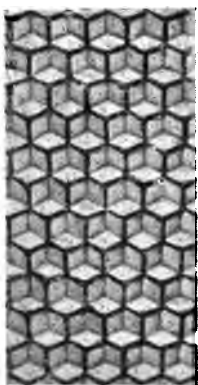
If it is preferred to raise the hive from the ground, short legs can be screwed on to the sides of the floor-board, but if four bricks are used as a support, one at each corner, the hive will be independent of a stand.

#### IV.—GUIDES AND COMB-FORMATION.

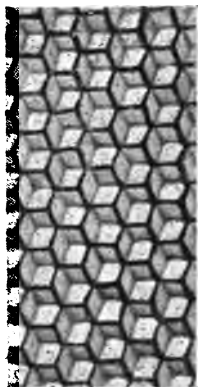
Frame-hives lose their advantages if the combs are built in an irregular manner. To prevent this, guides should be fixed to the top-bars of the frames. Comb-foundation, made of thin sheets of wax impressed with the forms of cell-bottoms, is generally used, and is of immense service. If whole sheets are fixed in the frames with due precaution, they are quickly converted into combs of perfect straightness and having only worker-cells.

If the top-bar has a saw-cut in it, the foundation is fixed as follows:—Take a piece of  $1\frac{1}{4}$ -inch board, 17 inches long and 3 inches wide, drive two  $1\frac{1}{2}$ -inch French nails through it so that they project  $\frac{1}{4}$  inch on the under side on a line drawn along the centre of the board, and put each nail  $1\frac{1}{2}$  inches from the middle; now turn the board over, and screw or nail it to a bench or table, invert the frame, and place the

saw-cut in it over the nails; then give the frame a slight turn to open the saw-cut wider, and insert the foundation, when, on releasing the frame, it will be securely fixed (fig. 8, p. 23). If the saw-cut in the top-bar is wide enough, the foundation is passed into it so as to allow about  $\frac{1}{16}$  of an inch of the wax sheet



Right way to fix.



Wrong way to fix.

Fig. 11.—Comb Foundation.

to project above the top-bar; it is then secured in its place by passing a warmed smoothing-iron along the top-bar. This melts the wax and firmly fastens the sheet so that it cannot possibly slip from its place. Care is necessary not to use force in trying to get the sheet of wax into position, especially at the ends



where the saw-cut cannot be opened out ; if the wax is crushed it will certainly tend to a subsequent breakdown. Beginners should get some practised hand to show them how foundation is securely fixed.

From motives of economy or convenience the bee-keeper may, if he likes, cut his foundation into strips from one inch to two inches wide, and fix these as guides for the bees to work their combs from. These may be fixed with hot wax. The wax must not be burnt, and in order to prevent this it should be melted in a jelly-pot, which can be placed in water, kept boiling, when the wax is required. The water must be boiling, for, using wax only just warmer than its melting-point is a frequent cause of failure. For fixing these "starters" the following is the method. Procure a piece of board  $\frac{3}{8}$  of an inch thick. Cut this to fit easily into the frame, and on the back nail two strips of wood projecting an inch beyond each end of the board. Lay the frame on these projections, place the strip of foundation on the board, allowing its edge to touch the under side of the top-bar, which must be held in an inverted position, and at an angle. Now run a little molten wax with a spoon at the highest point in the angle formed by the wax-foundation and the wooden frame, and allow it to run down to the other end ; when the wax is quite cold the foundation will be firmly fixed.

## V.—QUIETING BEES.

All country people are aware how little disposed bees are to sting when swarming. This is because they are then full of honey; and it is now well known that, whenever a bee is in this condition, it will not sting unless actually injured.

If, then, before opening a hive, or lifting up a skep, the bees are made to gorge themselves with food, they will be in our power. Blowing in a little smoke among them will do this, if they have honey within reach. It is not desirable to use tobacco, and very little smoke will suffice. Take a roll of brown paper, old cotton rag, or corduroy, set it smouldering, and blow some of the smoke in at the hive entrance. Startled by the fumes, the bees run to their honey, and if the quilt is lifted or the skep is turned up, numbers of them will be found with their heads buried in the cells, drinking as fast as they are able. Whatever may be necessary can now be done without discomfort. More smoke may be given, from time to time, if the bees show temper. It cannot be too strongly emphasized that proper care must be taken in choosing the day and hour for the examination and manipulation of bees; wet, windy weather, and such times as the bees are inactive, should be avoided.

Whenever there is a disposition to rob, all operations should be carried out in the evening, about an hour before sunset. It is very desirable to be able to

give smoke whenever required, and for this purpose the owner of a few hives would find it true economy to buy a smoker. The one known as the "Bingham," fig. 12, is much better than most, if not the very



Fig. 12  
Bingham  
Smoker.

best, and in it the fuel will burn, without going out, so long as the supply lasts. Smoke, therefore, may be justly termed a *bee-quieter*. It is not, however, the only one. *Carbolic acid* has been much used of late for the purpose of subduing bees, and has some decided advantages over smoke, since it is more easy of application, is equally effective, causes less disturbance, and at the same time is a powerful disinfectant and preventive of foul brood and other diseases. Being a powerful caustic much care is required in its use, since it not only blisters the

skin, but is highly poisonous. As a bee-quieter it should be used thus:—Into an 8-oz. medicine bottle (preferably one marked off for ounces) put 1 oz. of Calvert's No. 5 carbolic acid and 2 oz. of water; the bottle should be provided with a nicely fitting cork with a groove cut lengthways along its side, so that when the bottle is turned upside down and shaken, the liquid will fall in drops. Lay a piece of calico about 17 inches square upon the ground, and

sprinkle it with the mixture, not to saturate, but just to well damp it: double this up, and put it in a small tin with a cover: it is then ready for use. When required, take the cloth from its box: then quickly, but quietly, peel the quilt from the frames, and at the same time draw the carbolic cloth over them. If this is neatly done, the bees will at once retreat about an inch below the top bars, and the cloth may be in part doubled back, and the hive examined. Whenever the bees regain confidence and appear aggressive, draw the cloth back again over the frames for a moment. The price of Calvert's No. 5 is about 10d. or 1s. per 16 oz.

Racks of sections, also, may be thus cleared of bees and removed from the hive while the bees are at full work, if the operation be done quickly. If it be too long about, the bees will swarm back into the sections, and be more difficult to dislodge.

For securing full protection to the face, it is advisable to use a veil made of black net (costing a few pence per yard). A piece of this, about 27 inches by 24 inches, is made into a bottomless bag; a hem is then added round the top and a piece of elastic put in. The veil is worn over the hat, tucked in about the neck, and the coat is buttoned up. The hands may be protected by very thick woollen gloves; but they are clumsy things, and their use should be dispensed with as soon as possible. The scent of crushed bees, or bee-stings, remains in them a long time, and is

most offensive and irritating to bees, so that stocks that would have allowed a clean, bare hand to manipulate them unharmed, are needlessly provoked to sting. Some cautions may be given. Never use more smoke than is necessary, and avoid jarring the hive or the combs. Move with quiet deliberation, and work with a steady hand: do not strike at or fight a threatening bee. To do so is worse than useless.

#### VI.—BEE STINGS.

When a sting is received, it should be removed without pressure upon the poison-bag which adheres to it, the loss of which causes the death of the bee. Push the sting out with the back of a penknife or the finger-nail, and then apply to the wound a little damped carbonate of soda or a drop of liquid ammonia, if available. Should the swelling be hard and painful, fomenting the part with hot water will afford relief. It is a well-ascertained fact that, after a time, bee-keepers become inured to the poison, a sting then having little more effect than the prick of a needle.

#### VII.—NATURAL SWARMING.

As the spring advances, and food begins to be carried into the hive in abundance, the queen deposits eggs in daily increasing numbers, and soon the population so grows as to make it desirable for the bees to break up into a second community, or, in other words, to swarm. Usually, but by no means invariably, as

much as seven or eight days before the swarm leaves, the bees make preparation for it by beginning to raise new queens, as described under the head "Natural History of Bees" (see p. 13). When the queen-larvæ have been sufficiently fed, they are sealed over, and the swarm prepares to depart, if time and weather are favourable. The bees after gorging themselves to their utmost, each one carrying about enough food to last for four days, pour out by the hive-door in a constant stream, circling round in the air, and filling it with their merry hum. Generally they quickly settle, gathering together in a cluster, which may be seen to grow rapidly in bulk as the flying bees join it.

As soon as they have fairly "settled," proceed to hive the swarm as follows. If the cluster is on a low branch of a tree or bush, lay a cloth or sack on the ground as close under it as possible, and hold a skep—with the feed-hole, if there is one, closed with a bung—bottom upwards beneath the swarm: shake the branch smartly, and the bees, holding on to each other, will fall in a mass into the skep. The latter should now be very gently turned over, and placed upon the cloth, with a bit of wood or stone under its edge, so as to let the outside bees run under the hive. As much of the swarm as possible should be secured at the first shaking, in order to increase the chance of securing the queen. This safely done, the bees within will soon suspend themselves from the roof, while those still on the wing will

join those in the skep, which should be placed, so soon as all have entered, in its permanent position, or close to the frame-hive to which the swarm will be transferred. Any stragglers will return to the parent stock.

If the queen is not secured, the bees, quickly becoming restless, will desert the skep, and return to the cluster. Then the operation will have to be repeated.

When frame-hives are used, the swarm is first secured in a skep, as already described. Then, in the early evening, the bees are transferred to the frame-hive on its permanent stand. The hive being ready, with its frames fitted with brood foundation, covered with a light quilt, the front is raised about an inch by means of wedges; a board, as wide as the hive, is placed in front of, and level with, the alighting board, sloping down to the ground, and a cloth is spread over both the alighting board and the temporary platform, reaching down to the ground at the sides. Then take, between the palms of both hands, the skep containing the swarm, and carry it, mouth downwards, until it is just above the sloping board, and by a smart jerk throw the bees on the cloth. They will at once begin to take possession of their new home, and, when all are in, the wedges are removed, and the hive-front lowered to its proper position on the floor-board. It is usual to watch for the queen while the bees are running in, as it is a satisfaction to see that she is there uninjured.



Fig. 13.—Hiving a Swarm.



If the swarm is placed on the spot occupied by the hive from which it issued, and the latter is taken to a fresh stand in some other part of the apiary, after-swarms will frequently be prevented. When space admits of it, hives should be placed six feet apart, and, in any case, they should not be nearer together than three feet. If, at the time of swarming, any supers are on the hive, these should be removed and put upon that in which the swarm has been secured.

Hiving swarms into frame-hives from skeps may also be performed, if necessary on account of wet or cold weather, as follows :—Having removed the quilt and two or more frames, shake the bees from the skep by a sudden jerk into the hive, and cover over with the quilt; when they have clustered, replace the frames and quilt, and the operation will be completed.

If bees choose awkward places for settling, the bee-keeper's ingenuity may be tried. Sometimes it is best to use a large quill feather to brush them into the skep, while often they may be secured by fixing the hive over them, and driving them toward it by fumes of smoke or by the carbolic cloth. It will be found, as in many other cases, that persuasion is better than force, and a little piece of honey-comb skewered into the skep will make it so attractive that the swarm will eagerly enter.

Never smear the hive with anything: sugar, beer, treacle, are all alike worse than useless.

Always remember that bees at swarming-time are excited and heated; if, therefore, the receiving-

hive must be left in the sun, it should be shaded by an umbrella, or have a wet towel or some branches put over it.

If a swarm has settled, and no one is at hand capable of hiving it, careful shading, or an artificial shower of rain from a very fine rose watering pot, or garden syringe with rose-nozzle, will usually induce the bees to remain until the operation can be performed. If bees are to be taken to a distance to be put into the permanent hive, the removal should be made as soon as possible, the swarm being secured in the skep by a cheese-cloth (see p. 94).

#### VIII.—AFTER-SWARMS, OR CASTS.

From what has already been said (last chapter), it will be seen that the swarm goes off with the reigning queen, usually about the time the queen-grubs are being sealed over. Eight days after this the most advanced of these hatches out, and her first impulse is to destroy all the other queens yet in their cells. In this she is assisted by the workers, unless they have determined to send out a second swarm, or cast. Then, instead of the unhatched queens being destroyed, the workers keep guard over them, and the existing queen will go off with as many bees as choose to follow. Often two—sometimes as many as seven or eight—queens, which have left their cells about the same time, will go with one cast of bees. If these be hived, however, all the queens will be destroyed save one.

Casts should not be encouraged, as through them the old stock may be so weakened as to become useless; and the casts themselves, unless fed, are seldom strong enough to be profitable; although, if they winter safely, as their queen is young, they will probably do well in the following spring. Casts may be prevented by cutting out all queen-cells, save one, after the swarm leaves. If this is done, much care must be exercised, as empty queen-cells occasionally have their lids closed, so as to appear to contain unhatched queens, while now and then they fail to hatch. Only hives with moveable combs admit of such an examination as to make this method of preventing casts certain or easy to attempt.

### IX.—DRIVING.

Driving is the art of compelling bees to leave their hive at the will of their master; and is an operation often necessary with skeps or box-hives, both to make artificial swarms and to clear the full honey-combs of bees, when we wish to take their stores. A skep of about the same size across as the one to be driven, a 6-inch steel skewer, a pair of "driving irons," or two strips of wood with round nails in their ends, an empty pail, and some sort of table on which to work, will be necessary. The hive to be driven should be subjected to a little smoke, and then removed from its stand to some quiet spot, and an empty skep put in its place. Blow into the hive a

little more smoke, which will send most of the bees to their honey to fill themselves; and if, before



Fig 14.—Driving.

giving another puff, the hive is rapped three or four times, it will add to their surprise, and make

the operation easier. Allowing three or four minutes for these actions to take effect, give a little more smoke, and immediately lift the skep; then, turning it upside down, place it upon the table, putting the empty hive over it, as shown in the woodcut, fig. 14, p. 39, bring the edges of them together at the point towards which the combs run. While holding the empty skep in the right position with one hand, with the other, push the skewer downwards through the edges at the point where the hives meet, so as to form a sort of stiff hinge, while two strips of wood with nails in their ends (or "driving irons" sold for the purpose) fixed into the hives, as shown, will give greater freedom to the hands. The bees being frightened, and having filled themselves with honey, will be disinclined to sting. Stand with your back toward the strongest light, and keep the opening between the skeps before you, so that you may easily see all that passes. If your skep has a round top, it will be wise to place it upon a small tub, or wide pail, as seen in the woodcut; or it will not be sufficiently steady to allow you to proceed in comfort. Without delay, commence rapping on the sides of the inverted skep, the open hands being better than sticks for this purpose. The blows must be smart enough to jar the combs, but not sufficiently heavy to risk breaking them from their attachments. The raps must be continuous (for if they cease the bees will again descend among the combs), and they should follow one

another at the same rate as steps in moderate walking pace.

Daylight, the overturning of the hive, and the incessant agitation of the whole, put the bees into great commotion. A strong, hissing buzz will generally, within a minute or two, announce that a start is about to be made, and then the crowd will run up. While the beating is continued, sharp watch should be kept for the queen, and, after some experience, the bee-keeper will rarely fail to detect her.

The most effective side on which to administer the blows is that towards which you wish the bees to advance; but it is not advisable to apply the rapping too near the rim, as this tends to shake the bees down again after they have clambered to the top. Should they cluster together and refuse to move from any particular part, a puff of smoke will at once set them running, or they may be helped forward with a feather or the finger.

In chilly weather, or when honey is scarce, bees can be driven much more easily, if, after administering the first puff of smoke, the hive is lifted, and about a gill of warm, very thin syrup is poured over the combs. A quarter of an hour should be allowed to the bees for licking it up. The excitement raises the temperature, and puts the bees into first-rate order for the operation.

Driving is inexpedient in the case of recently established stocks, as the tender combs would be broken by the necessary blows, but it may be done if a few



Fig. 15.—Combs in a Straw Skep.

days previously one or more skewers are thrust through the sides of the hive right across the combs.

When turning a skep upside down for driving, and especially when replacing it, turn it in the direction the combs are built, not across them, or they may break off and give much trouble.

The kind of driving above described is called "open driving." But the timid may prefer another method, known as "close driving," which, however, is not recommended, as the presence and safety of the queen cannot be verified in her passage from the one skep to the other. By this plan the hive is treated and inverted as before; but the upper skep is so placed that the rims of both meet and correspond, while round the two a jack-towel, or strip of calico, is fastened to prevent the escape of any bees. The beating, as before, sends the bees above. The towel is removed and the stock and swarm may then be dealt with as desired. In the case of a number of hives being driven, the close method has decided advantages, especially that of limiting excitement.

### X.—UNITING.

It is often desirable to join two or more stocks. Perhaps they are weak, and separately of little value, or unable to stand the winter, or one may have lost its queen at a season when she cannot be replaced. With swarms or casts uniting is easy, no preparation being needed, if the one has not come off more than a day



or two before the other. In the evening, blow a little smoke into the hive containing the older swarm, or cast, and throw the strangers down against the hive-door, when they will run in. Much of the success depends on the bees having their honey-sacs full, so that, if a swarm should be discovered that has come off, and remained unseen during the previous night, at least, it will not be safe to attempt uniting it to another until the bees have been well fed, or thoroughly sprinkled with thin syrup, time being afterwards allowed them for clearing it up.

Uniting established stocks requires more care.

If two skeps which have stood in the same garden are to be joined, they must first be brought side by side by slow degrees, or many bees will be lost. Let their approach to each other be made by removals of not more than a yard each day, not reckoning those days upon which the weather has not permitted the bees to fly. When the distance between them is reduced to a couple of yards, drive the bees from the hive to be broken up: gently turn up the skep into which they have been driven, and sprinkle them with *thin* syrup scented with peppermint, cloves, or aniseed. Smoke the bees which are to receive the strangers, and, lifting their hive, sprinkle between the combs similarly scented syrup. After an interval of a few minutes, give another puff of smoke, sprinkle again, and putting down the skep between the two stations which the hives previously occupied, and propping

up its edge, throw the driven bees down against its entrance upon a large board, newspaper, or sheet, as explained under the head "Swarming." Some recommend that both stocks of bees be driven and united, scented syrup being used to both sets of bees. To unite bees in frame-hives, attention to position will be as necessary, as in uniting skeps. Outer unoccupied frames being removed from the hive which is to receive the addition, the bees are smoked, and the frames drawn together, scented syrup being used as with skeps. The smoking and scenting are repeated with the second hive, and, if one of the queens can be utilized elsewhere, she is, of course, taken away. If both queens are not required, and one is known to be a better breeder than the other, destroy the inferior one. The frames in the first hive are now spaced sufficiently apart to take another frame between each, and those of the second hive are lifted out one by one, and put in the same order between those in the first hive, keeping all brood in the centre for warmth. Then, brushing off all the rest of the bees left on the combs for which there is no room, and, covering all up, the work is completed. Instead of using scented syrup, the bees may be dusted pretty liberally with flour sprinkled from an ordinary dredger, as each frame is lifted out. Should it be desired to join a lot of driven bees to an established stock, care is needed to prevent fighting, especially if no honey is being gathered at the time.

Get an empty hive (any make-shift will do), place it alongside the stock; take half the combs from the latter, jerking the bees off before removing them; place them in the empty hive, spacing them wide apart; throw the driven bees into the space between the combs; and put on the quilt. In a day or two they may be joined in the way already explained.

### XI.—ARTIFICIAL SWARMING.

To avoid the trouble of watching for swarms, and the risk of eventually losing them, methods of swarming artificially are used now by all advanced bee-keepers. Artificial swarming cannot, of course, be performed so readily or neatly with skeps as with frame-hives. If there is only a single skep to swarm, it should not be operated upon unless the stock is very strong, and apparently near the condition in which it would be likely to swarm naturally. Nor should it be attempted unless the weather is good and honey abundant, as the swarm would need careful feeding until the conditions become favourable. Two empty skeps will be required—one to occupy the old stand and receive the bees returning from the fields, while the stock is absent; the other to receive the swarm to be driven, as explained in the last chapter.

During the driving a sharp look-out must be kept for the queen, and a little practice will enable the operator, in almost every case, to pick her out as she **stammers up amidst her terrified children; but if she**

be not found, the bees must either be returned, and a second attempt made at another time, or the driven swarm must be placed on the old stand and watched. If the bees remain quietly clustered in the hive, the queen is almost certainly there; but, if she be absent, the bees will commence rushing wildly in and out, searching for her. In this case, the old hive must be driven again until she is secured, and added to the driven bees, or the attempt must be given up, and all the bees returned. Not more than half the bees need be driven if the queen has been seen to join them, and a sufficient number must always be left to build queen-cells and hatch out the brood in the old hive.

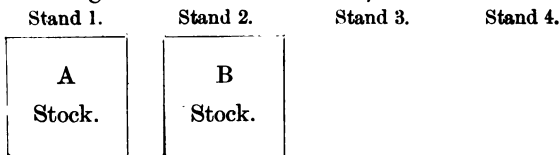
If it is intended to keep both stock and swarm, place these at equal distances from the old stand, with an interval of not more than three feet between them, so that each shall have the same chance to receive bees returning from the fields. If one should appear too weak, it will be strengthened by placing it nearer to the old stand, and removing the other farther off for a time. If the swarm has been sold, pack it up (see pp. 50 and 94), and put the stock in its former place.

*Making Three Stocks out of Two in Skeps.*—Having two stocks, neither of them ready to swarm naturally, an artificial swarm may be made out of the two as follows:—In the early part of a fine day, when bees are flying freely, drive, as nearly as possible, every bee, of course including the queen, from the first hive, and place this driven swarm in an empty skep on the old

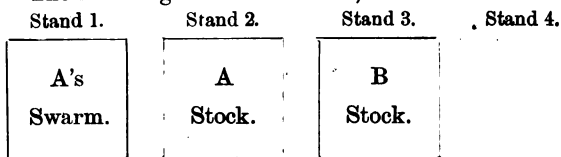
stand. Now put the hive of combs and brood, from which the bees and queen have been driven, upon the stand of the second stock, removing this latter to a new position. This plan is extremely simple, and gives a strong early swarm, consisting of all the bees of the first stock. The flying bees of the second stock, on their return from the fields, enter the hive of comb and brood which has been placed on their stand, and perform the work of raising a new queen, while the young bees (with their old queen) of No. 2 remain with it; and from constant hatching of brood, it will soon become as strong as at first.

This method is also suitable for frame-hives, substituting the shaking of bees from their frames, as explained in the latter part of this chapter, for the troublesome process of driving.

A diagram will make this clear, thus :—



Then making three out of two, there will be on—



Ten days later, another swarm can be made by

driving all the bees from B's stock, when A's stock, now raising queens, will go to a new stand, B's stock taking its place. Then the position will be as follows:—

Stand 1.	Stand 2.	Stand 3.	Stand 4.
A's Swarm.	B Stock.	B's Swarm.	A Stock.

But in A stock there are now a number of queen-cells sealed; only one of these is required for re-



Fig. 16.

- a. Queen Cell.
- b. Ditto, from which Queen has hatched, leaving lid.
- c. Sealed Workers.
- d. Empty Worker Cells.
- e. Sealed Drones.

queening the hive, and one, or, for fear of failure, two may be cut out with a square inch or so of comb attached, and securely inserted between the combs of B stock, special care being taken that its end is not pinched, and that it is left perfectly free for the escape of the hatching queen (see fig. 16). This will have the effect of giving to the stock a queen ten days earlier than they could have raised one themselves. This is of immense consequence,

considering the number of eggs a queen will lay per day in summer. It is not safe to remove queen-cells

until near the time of hatching, which may be known by the roughening of the ends through the partial removal of the wax.

When movable combs are used, swarming may be very quickly performed by removing the frame-hive to a new stand, and lifting from it a comb of brood, with the queen and the adherent bees. This is placed in a new hive on the old stand, which should have been previously furnished with comb or foundation (see "Guides and Foundation," p. 26). The gap, made in the stock by removing the frame, should be closed up by drawing the other frames together; otherwise the bees, finding an empty space in the middle of their hive, would fill it up with drone-comb.

If a swarm has been sold it is made thus:—Having given sufficient smoke to induce the bees to fill themselves with honey, remove the stock, and place a large flat board on its stand; upon this put a skep (or box) to receive the swarm, propping up the front edge with a stone or wedge. The comb on which the queen is found is now carried to the skep; she is gently lifted up by the finger and thumb, grasping her over the roots of her wings, and placed at the hive-door; the comb is now sharply jerked downwards; the bees fall, and, with the queen, run into the hive. Frame after frame is brought, and the bees from each are shaken off, close in front of the skep, until enough for the swarm have been collected. When the bees are well clustered, the skep may be placed quietly on a piece

of canvas, the ends of which should be gathered up and tied securely. Swarms should *always* travel with the mouth of the skep or box upwards. If a box is used the canvas should be nailed to the edges. The swarm having been removed, the stock is returned to its old stand. From this explanation, the way of making two stocks in frame-hives into three will be understood.

## XII.—FEEDING.

Neglect of feeding is, on the one hand, the occasion of the death of a great number of colonies; and, on the other, intelligent attention in this matter does more than anything else to increase the harvest of honey, and to keep the bees in good heart.

*Autumn Feeding.*—If in the middle of September skeps weigh 20 lb. they may generally be considered heavy enough to stand the winter; but allowance must be made if the combs are old and heavy with pollen. Then the weight ought to be more than that stated. With frame-hives, each stock—particularly if carefully wintered according to directions given further on—will be amply provided if it have about two superficial feet of sealed honey. If the bee-keeper does not intend to extract his honey, poorly supplied hives may often be most conveniently assisted by receiving one or two combs from their richer neighbours. In feeding to bring stocks up to the required weight, the syrup should be made with 10 lb. of sugar



to 5 pints of water. Let this syrup be taken quickly or much of it will be employed in raising brood.

Feeding at the close of the honey-harvest often has for its object the rearing of young bees. This is called "stimulative feeding." In



Fig. 17.  
Regulating Bottle-feeder.

this case the food is given slowly, but very regularly, to the amount of about a quarter of a pint each evening. The result is the encouragement of the queen in egg-laying, by which is raised a large population of young bees, which will live well into the succeeding spring, and keep the stock strong,

until other hatches of brood are ready to take their place. Syrup used for brood-raising should contain about 10 lb. of sugar to 7 pints of water. (See advice given respecting flour-candy under "Wintering," p. 86.) Stimulative feeding should not be continued after the middle of September, when all stocks should be raised to the proper weight as rapidly as possible, and feeding-up completed by the end of the month.

*Winter Feeding.*—Unless bees have been neglected in the autumn, they will seldom require any attention during winter; but, should food then be necessary, candy (p. 56) can alone be given with safety.

*Spring Feeding.*—As a rule this is most needful, for bees, if left entirely to themselves, run great risk of permanent—often fatal—injury through scarcity of food, and even where this is not the case, they refuse to raise any very large number of young bees until honey begins to come in rather abundantly. By feeding regularly from the end of March, our stocks, if in good condition, rapidly grow stronger. To secure early swarms and strong rich stocks, able to gather surplus for sections and supers in summer, we must take measures in the early spring by attentive feeding. All profit, all success, depends upon having our stocks *strong* when honey is plentiful in the fields and gardens; and, to accomplish this, the bees must be encouraged to breed vigorously *before* the honey-flow comes. Syrup can be given to skeps, over the hole in the crown, from an inverted bottle, as described under the head of “Feeders”; but, whatever the plan adopted, the syrup should be rather thin, as recommended for brood-raising in autumn. It is advisable to place the bottle on the hive in the evening after the bees have gone to rest, and if it contains no more than will be taken down during the night, the bees will increase the more rapidly. In addition to sugar, the food, afterwards described as flour-candy, will be found immensely advantageous, if used under the quilt. Where stocks have sealed store, we can stimulate the queen to lay by uncapping the upper honey-cells with a knife.

The contents being carried down, breeding will be increased in consequence.

*Feeding Swarms.*—Swarms do much better when fed, even if the weather be favourable, but in wet seasons, or in comparative scarcity, feeding is a necessity. It should be regular, but not excessive, or too much drone-comb will be built. It should be continued for a fortnight, when it may cease, as the combs are then nearing completion, and the brood the bees are able to cover is mostly sealed.

*Feeding weak stocks* must not be overlooked, and will often be required when strong ones are prospering. This, in itself, is an argument in favour of strong stocks.

*Food.*—The place of honey, the natural food of bees, is well supplied by syrup made as follows:—

Dissolve in a clean saucepan over the fire pure cane-sugar (granulated or loaf) in water in the proportions previously given (pp. 51, 52). Be very careful to prevent, by constant stirring, any burning of the sugar, as this forms a substance—caramel—very unwholesome to bees. Add a heaped-up teaspoonful of salt, two good tablespoonfuls of vinegar to every 10 lb. of sugar, and one tablespoonful of Naphthol Beta solution, and continue to boil gently a couple of minutes.

*Naphthol Beta Solution.*—Procure of a chemist an 8-oz. bottle (fig. 18, p. 55) marked with eight divisions of one ounce each (two tablespoonfuls). Put an

ounce packet of Naphthol Beta into the bottle and half fill it with pure methylated spirit; shake well until the crystals are dissolved; then add spirit, till the liquid reaches the seventh line on the bottle (see fig. 18). The solution is now ready for use, and should be put into the syrup while the latter is hot, but not boiling. Each division will contain two tablespoonfuls, and half a division, or one tablespoonful, will be just the right quantity for 10 lb. of sugar.



Fig. 18.

*To make Bee-candy.*—Into a clean pan—placed on the fire—put half a pint of water, with 3 lb. of best white sugar, and, to prevent burning, begin stirring at once till the sugar is dissolved. Allow the liquid to boil for a few seconds; then cease stirring, and let a drop or two fall on a plate; if this sets at once, so that the surface does not stick to the finger when pressed, it will do; but if sticky, it contains too much water, and either more sugar must be added, or boiling must be continued to drive off the excess of liquid. The right condition being reached, remove the pan from the fire, and set it in cold water to hasten the cooling, stirring briskly all the time, until the mixture begins to turn white—or granulate—and become rather stiff, when it may be poured into any convenient mould suitable for the purpose, and lined with paper for easy removal, and to prevent sticking to quilts. The

candy so made will, when cold, be of such consistency as to become quite soft, and "buttery" when scraped with the finger-nail.

*Flour-candy.*—This is made exactly as described above, but, directly the pan is removed from the fire for cooling the candy, carefully add  $1\frac{1}{2}$  lb. of pea-flour to the 10 lb. of sugar, stirring briskly till the mixture begins to stiffen, and then proceed as before. In half an hour it will have set and be fit for use. Its effect is most beneficial. When used with frame-hives the attached paper should not be removed, as this, placed uppermost, will prevent the flour-cake from sticking to the quilt.

*Note.*—Naphthol Beta solution, in the same proportion as given for syrup, should be added to bee-candy and flour-candy, and stirred in just when it is taken off the fire.

### XIII.—FEEDERS.

Many means have been employed for *rapid* feeding, but nothing is more simple or generally satisfactory than a syrup tin, with a few small holes bored in its sunk lid, and placed upon the frames, or a wide-mouthed bottle covered with muslin, or coarse calico, tied securely over the mouth and inverted on the feed-hole, in skeps or hives with crown boards (fig. 19, p. 57). When the bottle is used, a little wooden stage,

from 1 to 2 inches across, must be provided, pierced with a circular hole, as shown at B in the simple hive (fig. 10, p. 24). The bottle is filled to the brim, and, after the muslin has been tied on, is rapidly turned over, and placed upon the feed-hole. The bees within pass up their tongues through the muslin, and, without leaving their cluster, take down the sweets. Cover the bottle, or robbers will be attracted. With skeps the rack described at page 70 can be used for feeding, if we remove the sections and the strips of wood

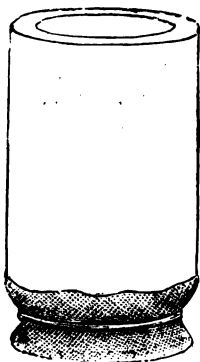


Fig. 19.

inside. The roof will cover the whole, and prevent robbers getting at the syrup.

#### XIV.—ARTIFICIAL POLLEN.

It has been already said that bees, during the time when breeding goes on, return home with little coloured (generally orange or yellow) loads attached to their hind-legs. This is pollen, the fertilising dust gathered from flowers, and is stored in the combs, to be afterwards consumed together with honey by the workers, and in their bodies transformed into a food wherewith to feed the young grubs. Without pollen, or a substitute, bees cannot raise brood, and, when natural pollen is not to be obtained,

bees will gather and store the flour of wheat, rye, or peas—the last being in all respects the best. If a tray, into which the flour has been put, be placed near the hives, with a little chaff sparingly sprinkled upon it so as to conceal about half the flour from view, the bees, especially if attracted by a small piece of comb containing honey, will soon commence dusting themselves and collecting the flour into pellets precisely like those formed from natural pollen. Stocks that are being fed with syrup will more readily take this description of food. The effect of artificial pollen in promoting early breeding is very marked, and ought not to be neglected. The tray should be protected from rain, and exposed in a sunny spot, the meal being renewed from time to time. It will only be collected when little pollen is to be obtained. From the beginning of March until the blossoms of peaches or pears open, will be the most suitable time for this kind of feeding, but after a cool wet summer it will greatly aid the effect of late autumn stimulation in promoting the raising of brood.

#### XV.—ROBBING OR FIGHTING.

For a week or two in early spring and autumn when honey is scarce and the weather open, stocks of bees are inclined to rob one another. The usual indication of this is a good deal of excitement about the hive-door, while, now and again, two or three bees in fierce combat are seen to fall from the entrance head-

long to the ground, and many dead or dying will be found. At the times indicated, the greatest care is necessary, as a little syrup spilt, or access given to a feed-bottle standing over a stock, is likely to lead to the ruin of some colonies. It has been said elsewhere that feeding with honey is particularly dangerous, because of its odour attracting marauding bees. Should fighting have commenced, the doorway must be reduced to half an inch in width. This will check the attack, but will seldom entirely stop it if the besieged stock has suffered much before attention has been drawn to it. It is found that a strip of glass, about 6 by 4 inches, placed against the front of hive, lean-to fashion, so as to allow the bees to pass out at either end, while covering the entrance, gives the defenders an enormous advantage, and helps to stop the mischief. If robbing is persistent, a piece of rag, moistened with a few drops of the carbolic acid solution mentioned on page 30, placed against the glass, will help to drive off the robbers.

## XVI.—PROFITABLE PRODUCTION OF HONEY.

Having described all that is necessary to some understanding of the chief operations of bee-keeping, the profitable production of comb-honey and extracted honey demands attention. For securing either, the hives must be so managed as to be crowded with bees and brood by the time that nectar becomes plentiful,



that is, generally speaking, about the beginning of June, but in an early season, by the middle of May, honey of the finest quality is often stored in abundance from fruit blossoms and hawthorn bloom, and, at this early period, commands the best price. If the bees have been carefully wintered and spring-fed, the hives will, by the above-mentioned time, be ready to receive the racks of sections. About noon on a fine, bright day, let the quilt be removed from the frame-hive, and the honey-cells at the tops of the frames unsealed with a sharp knife. This may be done, without removing the frames, by driving down the bees with smoke or a carbolic cloth placed on the top of the frames.

The rack of sections must next be placed upon the hive, and well covered up with warm material; then the hive-cover is replaced, and the bees, if strong in numbers, will at once take possession. Should the bees show a disinclination to enter the supers, one or two half-filled sections placed among the others will generally tempt them up, but the great secret is to wrap up the racks *very warmly*. When the rack of sections is about half filled, or rather more, if honey continues plentiful and the weather fine, to prevent a swarm issuing, another rack may be placed beneath the first, and even a third, in due course, beneath this, the uppermost being removed as soon as the sections are sealed. If the bees, by clustering outside, show signs of want of room, or of making pre-

parations for swarming, means should immediately be taken to cool the hive by wedging it up  $\frac{1}{4}$  or  $\frac{3}{8}$  of an inch on all sides, thus causing a current of air to pass between it and the floor-board, and allowing the bees to pass in and out all round.

In hot weather, hives must be well shaded when being worked for section-honey. In case of a swarm issuing, hive the swarm on six frames, with full sheets of foundation, but, as with only six frames, there will not be sufficient surface for the section rack to rest on, a piece of board of the same length and thickness as the top bars of the frames must be placed under the racks, to fill out the empty space. The parent stock should then be moved to a new station, and the swarm, with the racks of sections upon it, placed upon the old stand. Work will now be continued with redoubled energy.

The plan of storifying for extracted honey is more simple. In working for this, the hives must be of exactly the same dimensions as to width and length, so as to cover the stock-hive, and entirely interchangeable in all their parts. When the bees begin to show want of room, a hive filled with frames of foundation (or, better, with frames of comb reserved for this purpose) is placed upon the stock-hive with queen-excluder zinc between the two. The bees will at once take possession of the upper box, and in it store their surplus honey. When the bees have nearly filled the second storey and require more room, a third storey

may be given, and even a fourth is frequently required. At the end of the season, or earlier if desired, the honey should be extracted from all the frames in the upper storeys. The combs should be returned to be cleaned by the bees, and then put away for future use. The hive is thus reduced to the one original stock-box. There can be no doubt that extracted honey will grow in favour, and be used in much larger quantity than hitherto, but it will never entirely supersede, nor will it ever command the same price as, neatly worked sections of comb-honey, with their exquisite flavour and attractive appearance.

The shallow-frame boxes described on page 68 are worked similarly to racks of sections, and are now more generally used than the standard frame in storing.

To secure surplus honey the following suggestions should be carefully attended to:—

1st. Weak hives never yield a profit. If no one of four hives is strong enough to gather a surplus, unite them, before the honey-flow comes, into three, or even two. A good harvest of sections may then be anticipated. Many a bee-keeper has numerous stocks with little gain, while the same number of bees in fewer hives would have set him talking all the winter about the profits of bee-keeping.

Read "Uniting" (see p. 43), and do not think that this is only to be done when the honey-harvest is passed.

2nd. Even in the best-managed apiaries it is often found, at the time the honey-harvest opens, that some hives, though rapidly increasing, are not sufficiently crowded to take advantage of super-space, while the honey-yield is so short in duration, that to wait until the bees have sufficiently multiplied is to lose one's opportunity altogether. If comb-honey be the object, it will be wise either to unite stocks, as we have suggested, or, in the case of frame-hives, to contract the hive-space by removing every frame, filled or unfilled, that does not contain brood, leaving only those which are necessary for the egg-laying of the queen, and using a division-board, as explained under "Wintering" (see p. 87). The bees, although not particularly strong, are crowded aloft, and sections are filled when, but for this plan, we could have had no hope of such a honey-harvest. It must not be overlooked that, as the bees have no room for store in the hive-body, they will be left so poor on the removal of the sections that food must be supplied to them.

3rd. It is sometimes difficult to induce the bees to take possession of empty sections when placed on the top of the hive, and they will occasionally swarm rather than enter them. If, in a few days, the bees do not take to the sections when the honey-flow is continuing, further contract the hive by taking out two of the frames containing the least brood (which can be given to a weaker hive); and if any partly filled sections can be placed on the rack, an additional

inducement is given to the bees to commence working in the supers. At the end of the season, all unfinished sections should have the honey extracted from them, the sections being returned to the bees to be cleared of the little remaining in them. They may then be kept in store for use the next season.

## XVII.—SUPERS AND THEIR MANAGEMENT.

Combs spotless in their purity, and containing honey alone, can only with certainty be obtained by inducing the bees to build in chambers partially separated from the brood-nest. As bees naturally store their honey above their brood, these chambers are generally placed over it, and hence are called "supers," or "surplus chambers." A straw skep having a large central hole may be supered, if a flat board having a similar hole be first fixed over it, tempered clay, or something of the kind, being used between the hive and board to give the latter a firm resting-place, and to prevent the escape of the heated air. *All supers* whether on skeps or frame-hives *must be well protected by some warm covering* of flannel or cloth, or other similar material. They should also be furnished with guide-comb, or foundation (see p. 27). The bees, if ready for super work—that is, if really so strong in numbers as to begin to feel over-crowded while they are gathering honey freely, start at once the work of building comb. For the production of comb-honey what are termed

"sections" are employed, and for extracted honey "shallow-frames." Sections consist of little boxes having top, sides, and bottom only, like small but wide frames, which can be placed side by side over the hive.

The section represented in fig. 20 holds about 1 lb. of honey. The wood of which it is made is  $\frac{1}{8}$  of an

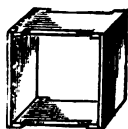


Fig. 20.  
Section.

inch thick; the dimensions are  $4\frac{1}{4}$  by  $4\frac{1}{4}$  by 2 inches. In order to allow the bees to pass into and out of the sections, a bee-way is hollowed out on the top and bottom, and not unfrequently this is provided in all four sides, these latter being termed four-bee-way sections.

The above dimensions are those in general use for holding 1 lb. of honey. They are made in one piece, as shown in fig. 21, and merely require to be folded,

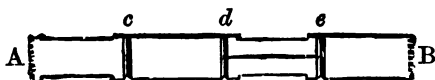


Fig. 21.

and the two extremities, A, B, fitted into each other to complete them. When filled with honey, a piece of glass, cut to the required size, can be fixed to the wood-work on each side, by means of gummed or pasted paper edging, and in this form comb-honey can be stored, dust and insect proof, and handled with safety.

The accompanying figures (22 and 23) will show how section-racks are fitted. A case, fig. 22 (termed a "rack"), should be made of wood, in which the sections may so rest that the bees will have an

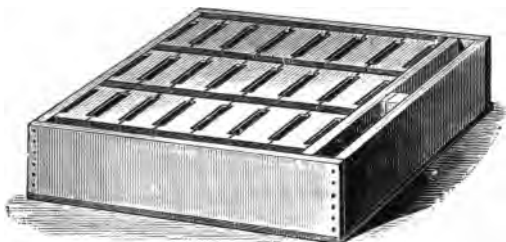


Fig. 22.—Rack of Sections.

opportunity of running freely between them and the frames below. The usual number of sections in a



Fig. 23.—Rack partially filled.

rack is 21, in seven rows of three; this size of rack will just cover a 10-frame stock. To ensure combs of regular thickness, with perfectly flat faces, the rows

have separators, made of thin wood, tin, or zinc, placed between them, and by means of an end-board and wedge the whole number are firmly held together. A quilt of unbleached calico and layers of carpet or felt, to keep in the heat, should be placed on the top, and the whole covered over with the roof. The bees work from the "guide" or "foundation" given them, until the separator prevents further building, and the sealed comb will have, in consequence, a perfectly flat face, if the separator is of the right size. Should the case of sections not wholly cover the hive-top, the vacant spaces must be closed by slips of carpet or wood.

At the commencement of the honey-flow, a case of sections is placed on the top of the hive, which *must* stand perfectly level: when about two-thirds filled with comb, the super is raised, and a second one placed below it. The two are, in due time, raised, and a third may be placed beneath. As soon as the top rack is completed, it is removed, and another placed beneath the other two; and this can be continued as long as the honey-flow lasts. When this begins to decline, no more supers should be given, but the bees must be allowed to complete those already on the hive. If honey is not coming in very fast, it is better, after taking some completed sections from the centre of the rack, to fill the gaps with the half-finished ones from the sides, reducing the racks to two, or even one. In working for extracted honey, shallow-frame boxes or supers are used instead of, or



in conjunction with, the section rack. They are of the same size as the hive, but only 6 inches deep, with frames  $5\frac{1}{2}$  inches deep. These frames are furnished with guides or with sheets of foundation, and in order to prevent the queen from going up into the supers, it is essential to place between them and the brood-nest a sheet of excluder zinc; that is, zinc perforated with holes of such a size that, while the worker bees can pass freely through them, the queen is unable

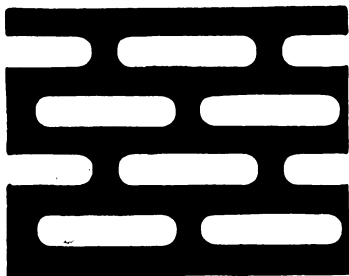


Fig. 26.—Excluder Zinc.

to do so. When removing the honey, the hints on "Quieting Bees" (p. 29) will be found useful, but by far the most convenient and safest way of clearing bees out of supers is by the use of what is known as the Super-clearer, or Bee Escape (see fig. 24). The super is raised, and the board in which the "clearer" is fixed is placed, with the circular opening upwards, on the top of the hive. The super is then put upon it, and left for some hours (preferably all night), when

it may be removed, and will generally be found quite clear of bees, the working of the hive not being disturbed at all by the operation.

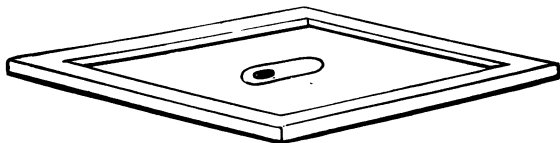


Fig. 24.—Super-clearer.

Sections may, also, be worked on the top of straw skeps, and for this purpose a case is provided, which fits over the hive, and contains the sections, as shown

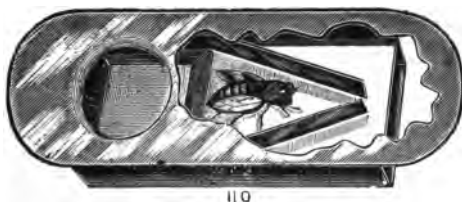


Fig. 25.—“Porter” Spring Bee Escape.

in fig. 27, p. 70. It is 15 inches square inside, and 9 inches deep. Inside, about  $4\frac{1}{2}$  inches from the top, is fitted an adapting-board, having a hole to correspond with the hole in the crown of the skep, and

over this should be placed a piece of "excluder zinc." Two pieces of board are fixed inside, running parallel with the sides, and 13 inches apart. Between these



Fig. 27.—Straw Skep with Sections on Top.

are strips of wood,  $\frac{3}{4}$  in. by  $\frac{3}{8}$  in., placed in such a way as to give the bees a clear passage under all the sections, which stand upon these strips. Passages should, also, be cut across, so as to allow the bees to

pass from under one row of sections to another. A board should be fixed within  $1\frac{1}{2}$  inch of one end, and against this the first row of sections will rest. Such a rack will hold eighteen 1-lb. sections, with separators of tin or wood between the rows. The space between the sections and outer case can be filled in with chaff or shavings, and a small chaff-cushion at the loose end of the rack will keep the sections warm. Iron pins pushed through the ends of the roof into the box will prevent its blowing off. The box should be secured to the skep by driving a couple of French nails through two of its sides into the skep. Carrying the box down to the floor-board would give additional protection. This box may be used for holding a feeder when required.

### XVIII.—THE HONEY-EXTRACTOR.

Comb is built at great cost to the bees, and with much consumption of honey. The extractor enables us to take the honey free from all impurities, and restore the combs, little injured, to be refilled, and thus greatly to increase the available harvest. At fig. 28 is shown an extractor, which may be taken as a type of the machine most extensively in use. The can is made of tinned iron; this forms a fixed vessel with an outlet closed, near the bottom, by a valve, by which the honey is drawn off. Within the can is a revolving cage, which is set in motion by the handle at the top. Frames of sealed honey-comb are taken

from the hive; the bees are smartly shaken and brushed off; the caps of the honey-cells are shaved off with a knife, and the frames are then placed in the revolving cage in pairs, ends upwards. By a few turns of the handle the honey is ejected from the outer sides of



Fig. 28.—Honey-extractor.

the combs, as water is thrown from a trundled mop. Care must be taken so to turn that the bottom bar leads, and the motion is not too fast, or the comb will break away from the frame. The frames are afterwards turned round, so as to bring the other sides of the combs outwards. Then, in the same way,

the remainder of the honey is "extracted." The wire-netting against which the comb rests should have metal supports at the back, to keep it rigid and prevent the breaking or bulging of the combs. The empty frames, damp only with honey, are, in the evening, given to the bees to refill. The operation of emptying may be repeated as soon as the combs are again sealed over.

Sections left unfinished at the end of the season should have the honey extracted, and then be given to the bees to clean up, and afterwards should be



Fig. 29.—"Bingham" Knife for  
Uncapping Combs.



Fig. 30.—Lamp  
for Heating  
Knives.

stored in dust-proof packages, for use the following summer. Combs cut from skeps may be placed in the wire-cage of the extractor, and when the honey has been removed they can be rendered down for the wax. Extracting should always be done indoors; otherwise the scent of the honey may induce robbing.

## XIX.—MARKETING HONEY.

A glance at the grocers' shops, filled as they now are with the various preserved foods, will show at once how important it is that everything offered for sale should have an attractive appearance. Many bee-keepers have complained that they could not dispose of their honey, but their difficulty commonly

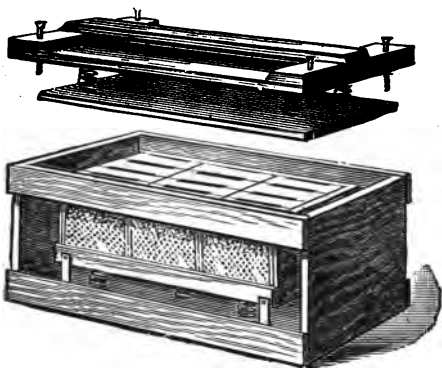


Fig. 31.—Travelling Case for Sections.

arises from the uninviting form which their produce presents to the eye. Neat white glass jars, to hold 1 lb. of honey, may be obtained at from 10s. per gross, and larger ones at proportionate prices.

Full honey-comb in the ordinary old-fashioned supers suffers another disadvantage, which often hinders the bee-keeper from finding a purchaser. It cannot be sent about safely by railway or carriers;

but filled sections, when packed in crates, as shown in fig. 31, will bear uninjured all the dangers of a long journey, if only ordinary care be exercised. It is easy, then, for us to send our sections to the different honey fairs so frequently held ; but, even at these, if we would find purchasers, neatness must be attended to. All wax and propolis, found on the edges and bottoms of the sections, must be carefully scraped



Fig. 32.—Travelling Case for Bottles.

off, taking care not to bruise the comb in so doing. The best sections should be placed in crates by themselves, and a full price demanded for them, the discoloured ones, and those not quite sealed over, being sold at a lower rate. The demand for honey is rapidly increasing, and, at the various shows, that which presents the neatest appearance generally secures a ready sale.



The retail value of honey in England varies with the season, but 6d. to 10d. per lb. for run or extracted honey, and 8d. to 1s. for comb-honey, according to quality and appearance, may be taken as fair prices. When honey is sold to dealers, at least 25 per cent. will have to be deducted from the above for the tradesman's profit and risk. Inferior qualities should not be offered for sale, but should rather be given back to the bees. The bee-keeper using frame-hives can take honey from combs in which the brood has been raised, and will obtain it by the extractor (p. 72), quite free from contamination. The skep system, except when worked for sections as shown (fig. 27, p. 70), so mingles brood and store as to make much honey useless that would otherwise be marketable; but, beside this, much of the honey from skeps is spoiled by the manner of taking it, even when the bee-keeper has grown wise enough to see the wastefulness of killing his bees, and tainting his honey with sulphur—the common habit being to cut and mix all the comb together, straining, and even wringing, the mass through a cloth, thus defiling the honey with all the impurities of the hive.

## XX.—WAX.

Beside honey, bees furnish another product which, because it is not in an immediately marketable form, is sadly neglected by bee-keepers. The wax, with which the combs are formed and the honey-cells

sealed over, is valuable material, and should never be wasted. It should be borne in mind that it is an indispensable substance for the manufacture of comb-foundation; therefore all who use bar-frame hives are interested in securing an abundant supply. Although under the system of movable-frame hives the storage



Fig. 33.—Gerster's Wax Extractor.

combs can be used for years in succession, yet it is advantageous to gradually renew them, and also the brood-combs, by discarding some of the oldest each season. These, and badly worked sections, together with the cappings removed while extracting and the odd bits of comb, which accumulate during the season's

work, should be rendered down, and the clean wax run into moulds. There are several methods of rendering. It is well, at once, to state that all those based on using ordinary domestic utensils are messy and irritating. The most effective appliance for the purpose is Gersters' wax extractor, a modification of the steam cooking-pot. The least troublesome apparatus is any

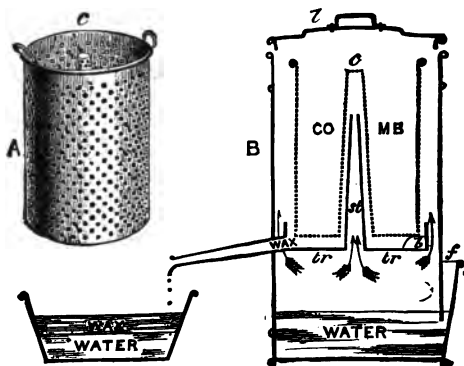


Fig. 33a.—Sectional View of Gerster's Wax Extractor.

well-made form of Solar Extractor, which, in its simplest form, consists of a wooden box, shaped like a plant-propagating frame, with a glass cover sloping from back to front. The wood of the sides and bottom should be thick enough to retain the heat, and be stained black. The edges, upon which the glass cover rests, should be faced with cloth or felt, to form an air-tight joint all round, and a loosely fitting tin tray, 2 inches

deep, should be provided, upon which to place the pieces of comb to be rendered. This tray should be slightly tilted forward, so that the pure wax, when melted, may run down, leaving the dross on the upper part. As the efficiency of a Solar Extractor depends upon its receiving and accumulating the heat-rays, the two chief points to attend to in making it are, firstly, the slope of the glass cover, which should be at an angle of  $55^{\circ}$ , that having been found the most effective in this country, for the hours during which the sun has sufficient power to do the melting; secondly, to prevent the escape of the heated air, by carefully stopping up all cracks and joints. A very simple, yet thoroughly efficient, Solar Extractor may also be made as follows: A large white wash-hand basin, either of china or enamelled ware, deep and round, is used as the outer vessel. To prevent the loss of heat as much as possible, it should be bedded in a box of dry sawdust, or, preferably, cork-dust. In the centre of the basin is placed a smaller vessel of enamelled ware, over which a piece of calico, or flannel, has been tied. The pieces of comb are laid upon the flannel, and the whole is covered with a sheet of glass—plate-glass is best. The extractor should be slightly tilted towards the south, and exposed to the full sunshine. The wax will drip through the flannel, and be found, in the evening, as a clean cake, inside the inner vessel. This appliance is admirable, also, for purifying the rough cakes obtained by boiling in the ordinary way. It is

well to bear in mind that it is the accumulated heat of the sun that is effective; therefore a clear cloudless day is requisite; more of such days occur in spring and early summer, and should be taken advantage of. Bees by no means prefer to use old or partly worked combs that have been stored in boxes or cupboards, and have thus become dry, dusty, and harsh. It is therefore economical to break up all such combs, and, in fact, any that are not good, sound, clean, and evenly worked out. Pollen-clogged combs should, also, be broken up. It is advisable to have a box, with a well-fitting lid, to be used for storing pieces of broken comb and cuttings and trimmings of foundation. When sufficient has been accumulated, the dark, heavy pieces should be separated from those of a lighter colour. The former should be crushed small, and soaked for at least twenty-four hours, the water being frequently stirred, and renewed as soon as it becomes turbid with the softened pollen. This soaking not only removes the pollen, but also wets the pupæ-skins contained in the brood-cells, and thus prevents them from absorbing wax during the melting process. If no special extractor is available, the melting can be done in an enamelled or *well-tinned* saucepan (contact with iron spoils the colour of the wax), not more than half full of water, because, otherwise, there is great danger of the wax boiling over and catching fire. It is better to bring the water to the boiling point first, then to put in the broken comb by degrees. Clean rain

or distilled water should, if possible, be used, as that containing lime or iron in solution gives the wax a bad colour. When all has been melted, it should be allowed to cool *gradually*, until the cake can be lifted off. The lower side will be dirty, and several remeltings in clear water will be necessary before the wax is thoroughly cleansed. Scrape the lower surface between each remelting. In most cases, the greater part of the wax may be obtained in a nearly pure state by pouring it off carefully, while liquid, after the second melting. When all has been purified, it may be cast into moulds of suitable shapes, which can now be procured from bee-appliance makers. These should be moistened with water, or glycerine, and slightly warmed, and the shape should be such that the cake of wax may be easily removed when cold. When wooden moulds are employed, they must be thoroughly soaked in water before use.

## XXI.—WORKING FOR HEATHER HONEY.

Throughout Scotland and the northern counties of England, the heath, or ling, is the source whence the main supply of honey is gathered. In August vast tracts of upland can be seen covered with purple blossom, from which tons of honey might be taken, were there sufficient bees to collect it; and bee-keepers are aware of this, for they are taking their hives, in annually increasing numbers, over long journeys to the moors to obtain the much-prized delicacy.

Beginners often gain valuable experience on their first journey, either through a stock being suffocated for want of proper ventilation, or from bees getting



Fig. 34.—“Heather” Hive.

out and attacking every living thing within reach. To prevent such mishaps, special attention has of late years been given to the manufacture of hives for moving to and from the heather. They should be

light, handy, small, without legs or outside projections; their parts easily, yet firmly, secured together, so that, with ordinary care, no bee can escape. Ample ventilation is imperative, and is usually provided by an opening, about nine inches square, cut in the floor-board and covered with perforated zinc; it is closed, when not in use, by a wooden slide underneath. When the journey is a short one, this ventilation, with the addition of a perforated slide run in the entrance, is, as a rule, sufficient; but should the weather be warm, and the stocks strong, it may be necessary to give ventilation at the top, by removing the quilts and substituting a piece of netting, or scrim, tied down closely over the frames, so that no bees can get out.

The Standard frame, with its ends shortened, so that the top bar is reduced to  $15\frac{1}{2}$  inches, is the one most in favour with heather bee-men, as it allows a full-size stock hive of ten frames to be made so that the outside measurement is less than 18 inches square, with the same depth. The frames of all hives taken to the heather must to prevent shifting about, be firmly secured, the self-spacing frames (fig. 7) being especially suitable. As frequently the road is a rough one, the comb should be fixed to the wood all round, and newly-built comb, unless well wired, should not be sent.

In order to make the most of the heather-crop, strict adherence to the following points is essential: 1st. Each stock must be strong, covering not less than



ten frames filled with brood, and headed by a young prolific queen. 2nd. A supply of drawn-out comb, such as extracted sections or frames that have been used for the clover crop, for at this season it is almost impossible to get the bees to build out comb-foundation. Having decided on the stocks to be taken to the heather, they should be fully prepared one or two days before the evening fixed for the journey. Any hive not of full strength should be given one or two frames of brood from another hive which stays behind. If section racks are on and propolized down, it is best to leave them, as they help to steady the frames, and allow a greater breathing space for the bees. All parts must be fully secured, with reliable fastenings, against coming apart on the road. Everything should be in readiness, so that on the evening of the journey nothing need be done but closing the entrance-slides, as soon as the bees cease flying, and loading up for the start. A light spring lorry is handy for the purpose, as thereby a greater number of hives can be taken at one time; but, whatever conveyance is used, it must be one on springs. In some Scotch districts, where many hives are moved, a special van, built for the purpose, is recommended on the score of economy and practical utility.

Having reached the spot selected beforehand, place the hives on their stands, and, when all is in order, remove the conveyance to a safe distance. Then, before opening the entrances, draw a feather dipped

in carbolic acid solution across the slides to prevent the bees rushing out when the slide is first withdrawn. After a few days the owner should make a visit to adjust the hives, give racks where necessary, and tidy up anything left undone. Warm wrapping on section racks and supers is needful at this season, for the nights are getting colder; attention to this point is well repaid by the increased quantity of honey stored above the brood-nest.

Heather honey will not separate from the comb by means of the ordinary centrifugal extractor; consequently, pressure must be employed, and several useful honey-presses are now on the market. One of these is shown in fig. 35. The comb is wrapped in cheese-cloth, then put between two grooved plates faced with perforated zinc or tinned wire, and strong pressure is applied. The honey comes out clean, and can, at once, be bottled for sale. The best of the honey is, however, preferred and used from the sections as comb-honey.

## XXII.—WINTERING.

When stocks die in the winter, it is, in almost every case, the result of ignorance, injudicious treatment, or neglect, while success depends upon attention to three or four principal points, some of which have already been treated under the head "Feeding."

There is nothing better as food for bees in winter than sealed honey, preferably that gathered during

the best part of the honey-season. Should there not be about two superficial feet of combs of sealed honey in the hive, food must be given in sufficient quantity, and early enough to allow the bees to seal it over before frost comes. Autumn feeding, by stimulating the rearing of young bees, also prevents



Fig. 35.—Heather Honey Press.

“spring dwindling,” which is the result of breeding ceasing too soon after the honey flow, thus leaving too few vigorous young bees to carry the stock through the work of early spring. Bees hatched in autumn survive proportionately later in the spring; but breeding should not be encouraged after Septem-

ber, since bees hatched too late in autumn do not winter well, and are frequently liable to dysentery.

Protection stands next in importance. Prevent damp, and see that roofs are proof against snow and driving rain. Entrances of hives should be contracted to keep out cold winds. Straw hives will pay, by improved spring condition and earlier swarms, for providing wooden waterproof boxes to place over them, or better still, frames of woodwork, filled with shavings or chaff, and covered by a roof. Beware, however, of providing snug winter quarters for mice, moths, and other enemies.

Frame-hives should have all combs removed which are not well covered with bees on both sides. The size of the hive must also be reduced by a division-board, or preferably by two, one on each side of the bees, the space between the hive-side and the division-boards being filled up with chaff or a chaff-cushion. A calico cover, with four or five thicknesses of flannel, felt, or good flat sacking over it, will keep the bees snug. But by far the best plan is to provide a chaff-cover, consisting of a framework of wood, the size of the hive-top, and three inches deep, having canvas or sacking loosely tacked on its bottom. This is placed over the calico and filled up with chaff, or cork-dust, which is not so liable to get mouldy from damp, and should be gently pressed down into place. Six Standard frames are sufficient for a strong colony, and the novice should not attempt to winter any

but fairly good stocks, uniting weak lots rather than running the risk of losing them.

If the hive illustrated on page 19 is used, the case D will fit over the hive, and leave room over the top for packing above the calico quilt. Make a calico bag with bottom 17 inches square, and about the same height, with a running string at top. Half fill the bag with cork-dust or chaff. When this is dropped into the space, it settles down on the top of the frames, and completely prevents loss of heat through the quilts, but its great advantage is seen when a feed-bottle is in use, and the bag is placed over it, for it accommodates itself all round, keeping the syrup at about the same temperature as the interior of the hive. Cork-dust is the best material for packing, as it retains heat well and is not likely to get mouldy. It may be obtained of grocers who sell Spanish grapes.

When snow is on the ground, an outburst of sunshine, unless proper precautions are taken, is likely to entice the bees out in great numbers, when they drop, in very many cases, from chill, and perish. To prevent this, the hives should be provided with a shading-board placed in front of the flight-hole. The entrances should in no case, however, be entirely closed.

Bees should be left in perfect quiet during severe weather; but when a bright and warm day comes, permitting them to fly freely, a cursory examination

of affairs in the hive may be made by turning aside the quilt, and ascertaining whether the food-supply is holding out. This should be done without disturbing the frames. The only admissible food during the winter months is candy, placed over an opening in the lowest covering and above the cluster. Do not meddle with the bees from idle curiosity; the quilt which they had carefully sealed down in autumn to stop cold draughts cannot be accurately replaced, and they suffer accordingly.

### XXIII.—DISEASES OF BEES.

When bees soil their hives within, they are said to be suffering from dysentery. The causes of this disease vary, but weakness in numbers, prolonged cold, and unsealed watery food, are the most usual reasons. The cure is a clean dry hive, wholesome food, proper ventilation, and increase in population.

Foul brood is the most terrible of all bee-diseases, and is sadly infectious, while it is only got rid of by great and continued attention.

When stocks are found generally weak, working languidly, scarcely profitable, and swarming little, *suspect foul brood*. If the malady is present, an examination of the combs will show some cells (many or few) with dying or dead larvæ and grubs in them, others with their covers sunken and perforated. Healthy brood is usually compact, the grubs are plump, and of a pearly whiteness. When young they

are curled up in crescent-shape at the base of the cells. On the other hand, if any are diseased, instead of being curled up, they will be found extended horizontally in the cell, presenting a flabby appear-

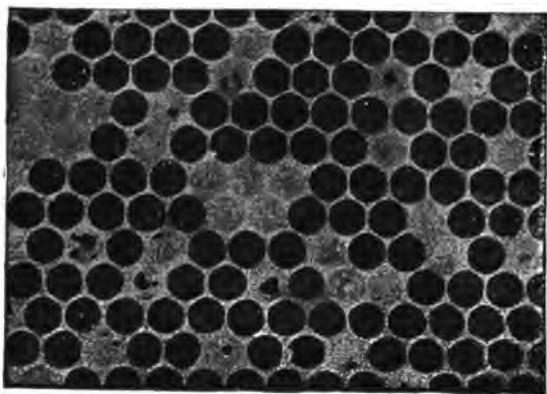


Fig. 36.—Foul Brood.

ance, and are of a pale straw tint. As they begin to decompose, the colour changes to brown. They then dry up, till all that remains is a brown scale adhering to the side of the cell. Should the larvæ survive until capped over, a few of the cells will be found here and there slightly indented, and darker in colour than those of healthy brood. The capped cells are in irregular patches and mostly perforated. On removing the capping, the contents will be found to consist of a putrid, sticky, elastic, coffee-coloured

mass, formed of the rotting larvæ. The bees do not seem to have the power to clean out the foul cells, and so they remain, spreading infection all round, until the stock becomes too weak to defend its stores, when some neighbouring colony probably robs it, and, in doing so, carries away the seeds of disease and death, which are thus spread, until all the stocks of a neighbourhood may be fatally affected.

Hives in which foul brood exists sometimes give forth a sickly and unpleasant smell, and when the disease is in a very advanced stage, the foul odour may sometimes be detected even at some distance from the entrance.

When the disease is discovered, it is best, if the colony is weak, to destroy bees, combs, frames, and quilts, and thoroughly disinfect the hives; but, if the bees are worth saving, proceed as follows:—To avoid chance of robbing, work in the evening, when the bees have ceased flying for the day. Having procured a skep or suitable box as a temporary home for the bees, remove the hive with the diseased stock to some distance, and put the skep in its place. Lift the frames one by one, jerking and brushing the bees off them into a good-sized tub or foot-bath; brush out with a goose-wing the bees that remain in the hive. The combs should be placed, as fast as cleared of bees, in some suitable receptacle, then taken away, and covered with a cloth saturated with dilute carbolic acid. Hive the bees by either pouring them



into the upturned skep or box from the tub, or throw them down in front of their new home (see under "Natural Swarming,"), and feed them with syrup medicated with Naphthol Beta (see p. 55). At once burn frames, combs, and quilts. Scrape the inside of the hive, then thoroughly scrub it, using boiling water (in which a handful of soda has been dissolved) and soap. When it has partly dried, paint with dilute carbolic acid (see p. 30, "Quieting Bees"), and leave it in the open air (if possible in sunshine) until the smell has disappeared, when it will be ready for use. An additional, and strong safeguard, is obtained by scorching every portion of the interior with the flame of a painter's blow lamp; it reaches every corner and crevice where germs may still lurk, and destroys them.

Furnish a hive with six frames, full sheets of foundation being used. After 48 hours shake the bees from the skep into the frame-hive, placing the latter where the former stood. Continue to feed with medicated syrup for some days, and burn the skep.

The disease is prevalent in many places, and being extremely contagious, it is well to adopt preventive measures against infection. Naphthaline in balls is generally used for this purpose. Two balls are split in half, and placed on the floor-board of each hive, in the corners farthest from the entrance, and when these have evaporated (usually in about three months),

they should be renewed. Clothes, appliances, and hands should be properly disinfected, otherwise the disease will be carried from hive to hive. The hands may be washed with carbolic soap, and the other articles may be disinfected by spraying with carbolic acid solution (described on p. 30) diluted with six times the quantity of water.

#### XXIV.—REMOVING AND PACKING BEES.

A bee, at its first flight, carefully marks the position of the hive, and should this, during the absence of the poor insect, be even slightly changed—if but three or four yards—it will, at its return, flutter about the old spot till it drops to die. Consequently, hives should always be moved with caution. On the other hand, hives may be moved a distance of not less than two miles without any loss, because the bees will note that they are upon new ground, and take their bearings, while they are not likely to get on the old track, so as to fly back to their former station. Natural swarms, if removed at once, will take to any position, as they seem to forget their old home.

In rearranging an apiary, hives, as we have before said, should not be moved (see “Uniting,” p. 43) more than a yard a day, and on days when the bees cannot go out, should not be moved at all.

Skeps containing swarms must *invariably* travel bottom upwards, with cheese-cloth tied over them;

but swarms should never be allowed to remain until they have built slabs of comb before being sent to their destination. Stocks in skeps, in the same way, travel inverted, secured by one thickness of coarse canvas; but in hot weather there is risk of the combs breaking down. The danger may, however, be much reduced by passing a stick through the skep from side to side, so as to pierce each comb. This should be done some days before the removal, as the bees will then fasten the combs to the stick, and so greatly increase their firmness; or pieces of cork may be inserted between the combs when the skep is inverted.

When preparing stocks for travelling in frame-hives, a case made of strips of wood one inch thick should be provided, of such a size that two of its sides rest on the "metal ends" on the top-bars of the hive it has to cover. When this case is screwed down, it keeps the frames of comb firm and rigid while travelling. Before being used, the protecting-case should have two thin laths nailed midway on its upper sides, and over all there should be stretched a covering of coarse canvas or cheese-cloth. The laths keep the canvas from the frame tops, and the space thus formed, not only provides ventilation, but gives room for the bees when getting over-heated to pass up from between the frames. After removing all quilts, the canvas-covered case should be screwed to the hive-sides, and the entrance covered with perforated zinc.

Stocks of bees, whether in skeps or frame-hives, should never be sent long journeys during hot weather; and in no kind of hive will newly-built combs covered by bees safely endure travelling.

### XXV.—CONDEMNED BEES.

Cottagers are still, unhappily, in many districts, in the habit of destroying their bees by sulphur, in order to take the honey. The inhabitants of the hives marked out for "taking up" are called "condemned bees." These can usually be bought at the end of the honey-season for a very small sum, the purchaser driving (fig. 14, p. 39) them into his own skep. The combs thus come into the cottager's hands with the honeyless cells empty, instead of being filled with dead bees, while the honey is uninjured by the fumes of sulphur; and these advantages rarely fail so to please the owner that the following season he is glad to have the work done even without receiving payment. If not less than three or four of these lots of bees be put together into one hive, and liberally fed until they have built and stored sufficient comb to carry them through the winter, they, as a rule, make very good stocks in the following spring. The absence of pollen may be largely made up to them by feeding with flour-candy (page 55), in addition to syrup. The candy must be put over the centre frames, above a hole cut in the lowest covering, and the supply renewed from time to time. In no other way can stocks

be procured so economically, and it is gratifying to reflect that while the "driver" obtains advantage, the bees are saved from a cruel death, and a brother bee-keeper from an act which certainly cannot be elevating.

In utilising condemned bees, the greatest care must be taken that all skeps from which they are obtained are free from foul brood.

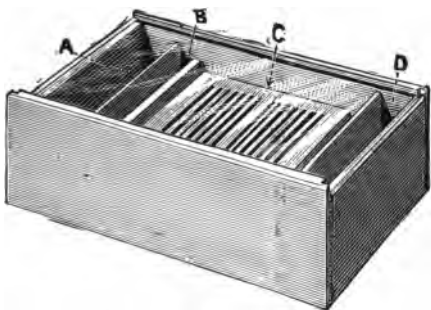


Fig. 37.—Rapid Feeder, with Provision for Flour-candy.!

Honey from a foul-broody hive is not unfit for table use; but, if bees are allowed access to it, or to enter the hive from whence it was taken before it has been thoroughly disinfected, the disease will be spread in the district.

Do not be led into buying second-hand hives without expert advice, and especially beware of those in which bees have died out. A foul hive is dear at any price.

## XXV.—LIST OF USEFUL ARTICLES.

Feeders }  
Smoker } These are essential.  
Veil }

Spare skeps, hives, and frames.

Scraper-knife.

Comb-foundation.

Section-boxes.

Unbleached calico for quilts.

Spare coverings, felt or carpet.

Chaff or cork-dust.

Goose wing and some wing feathers.

Small bottle of liquid ammonia, or some carbonate of soda.

Bottle of Calvert's No. 5 carbohc acid.

A box to contain all the smaller articles ready to hand.

## XXVI.—ASSOCIATIONS.

Help to the pocket, help to the hands, clearing away of difficulties, enlargement of experience, mutual instruction, facilities for purchase and sale, these and every other advantage gained in other walks of life by association and co-operation, are to be had by the formation of Village and County Associations of Bee-Keepers. The gratuitous visit of the county expert is thus obtained, by whose assistance and advice the cottager gets his stocks of bees examined

at the commencement of each season, the latest improvements in management, and practical lessons are learnt. At the same time, the sources from which supplies may be obtained, and where honey can be sold, are indicated. The expert will also give advice as to the treatment of cases of foul brood, and a perusal of the *Bee Journal and Record* will be obtained through the County Association or Village Club.

Those who do not themselves keep bees may do much good to their poorer neighbours by fostering such Associations.

The following is a list of County Associations affiliated with the British Bee-Keepers' Association :—

BERKSHIRE.	HAMPSHIRE & ISLE	NORTHUMBERLAND &
BRISTOL DISTRICT.	OF WIGHT.	DURHAM.
CAMBRIDGESHIRE &	HUNTINGDONSHIRE.	OXFORDSHIRE.
ISLE OF ELY.	KENT & SUSSEX.	SHROPSHIRE.
CHESHIRE.	LANCASHIRE.	STAFFORDSHIRE.
CORNWALL.	LEICESTERSHIRE.	SURREY.
CUMBERLAND.	LINCOLNSHIRE.	WARWICKSHIRE.
DERBYSHIRE.	MIDDLESEX.	WILTSHIRE.
DEVONSHIRE.	NORFOLK (NORTH).	WORCESTERSHIRE.
ESSEX & SUFFOLK.	NORTHAMPTONSHIRE.	YORKSHIRE.
GLAMORGAN.	NOTTINGHAMSHIRE.	

# *List of Honorary Secretaries of County Associations.*

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Bristol District ...	Jas. Brown, Bridge Street, Bristol.
Cambridgeshire and Isle of Ely ...	C. N. White, St. Neots, Hunts.
Cheshire ...	Rev. E. E. Charley, Ince Vicarage, Chester.
Cornwall ...	T. R. Polwhele, Polwhele, Truro.
Cumberland ...	Geo. M. Saunders, Keswick, Cumberland.
Derbyshire ...	R. H. Coltman, 49, Station Street, Burton-on-Trent.
Devonshire ...	E. E. Scholefield, Heathfield Chudleigh, S. Devon.
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Hampshire and Isle of Wight ...	E. H. Bellairs, Bransgore, Christchurch.
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Norfolk (North) ...	C. J. Cooke, Edgefield, Melton-Constable.
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Nottinghamshire ...	Geo. Hayes, 48, Mona Street, Beeston, Notts.
Northumberland and Durham ...	Jas. Waddell, Wooler, Northumberland.
Oxfordshire ...	H. M. Turner, Turl Street, Oxford.
Shropshire ...	S. Cartwright, Shawbury, Shrewsbury.
Staffordshire ...	Rev. G. C. Bruton, Great Haywood Vicarage, Stafford.
Surrey ...	F. B. White, Marden House, Redhill.
Warwickshire ...	J. Noble Bower, Knowle, Warwickshire.
Wiltshire ...	Rev. W. E. Burkitt, Buttermere Rectory, Hungerford.
Worcestershire ...	J. P. Phillips, Spetchley, Worcester.
Yorkshire ...	R. A. Grimshaw, 3, Manston Terrace, Crossgate, Leeds.



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