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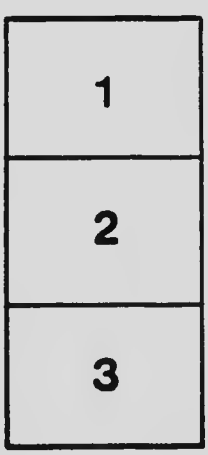

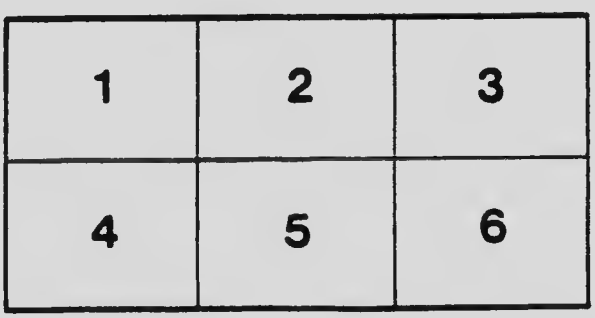

The Bee-Keeper's Companion

By S. S. Abbott

BELL & COCKBURN

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THE
BEE-KEEPER'S COMPANION

THE BEE-KEEPER'S COMPANION

BY

S. SHAPLAND ABBOTT

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CONTENTS

INTRODUCTION

WHEN I look up at the bookshelf over my table—a large bookshelf, and filled entirely with books about bees and bee culture—I feel that some explanation is needed of an assumption that would add yet another book to that already overcrowded library, where stand bee books and bee literature from the two-volume Treatise of Cheshire down to the single-page pamphlets issued by the Board of Agriculture. For an answer as to why I should do this, I would ask you to look again at the title of the book, as it is to be a Bee-keeper's Companion—not a long list of statistics or a category of various diseases, but simply a book that, without being too fulsome or too crammed with unimportant detail, shall nevertheless tell the amateur bee-keeper much that he will want to know, and much that may be useful to him in his life among the hives, as well as introduce the art of apiculture

to those who have never taken up bees or given the study of them any serious consideration. For it is the darling object of every bee-keeper, as soon as he has himself mastered the necessary preliminary details and kept successfully his first few hives, to convert his friends to bee-keeping as well; for, whenever a man takes up bees, he does not do it in a casual, off-hand manner. He takes them up seriously; his bees become part of his life, and their welfare and prosperity a thing among his first considerations; and I, like all other bee-keepers, want to show you what a fascinating, delightful hobby bee-keeping is—how easy and how simple, and how well fitted to the uses of men and women who have not much time to give to any hobby they may take up. I want to tell you about bees, therefore, as a hobby, not as a business; for, when animals are kept for the purpose of providing their keeper's bread, they lose at once all fascination and delight, and degenerate into mere machines. And so, when a man starts keeping bees for the sake of the profit he will make out of his honey, and the prices he will realise for his swarms, considering each feature and phase of the season as bearing a direct

relation to his profits at the end of the year, his bees become uninteresting and his hives a mere commercial undertaking.

Now, a great many people could keep bees for pleasure with advantage around London, for instance; the keeping of which bees would bring them into closer touch with many of the marvels of the outside world, without taking up much of their time or calling their attention away from their ordinary business.

And therefore it is to those people in particular that I address myself. I shall endeavour to point out to them how easily bees may be kept in their garden without harm to their children or danger to anyone. As I have said, I do not predict they will make a profit out of it; but they will, I can guarantee, find unending pleasure and amusement as well as instruction in one of the most wonderful works of nature, and as well have at the end of the summer a store of honey, the presence of which upon their tea-table during the darker days of winter will bring back many reminiscences of the summer, and recall many pleasant hours spent in the sunshine among the hives.

When you have read this book, do not

think that you will be a proficient bee-keeper, for you will not by any means. The science of apiculture is unending, and nobody knows all about it or possesses all the secrets of the bees. Each year and each succeeding summer brings with it fresh discoveries and new revelations; therefore, although you will not know a hundredth part of what there is to know, yet I trust you will have your foot on the first rung of the ladder and your enthusiasm stirred, so that all the rest may be accomplished.

Now, lastly, as to the method to be adopted. It is a very difficult matter to select a method which shall accomplish the object in hand, for bee-keeping is on the one hand a true and idealistic conception of economic infallibility, while on the other hand it consists of such a mass of explanatory detail as to its ways and methods as to seem practically endless, tedious to write about, and wearisome to read. And all authors of books about bees have found themselves confronted with this difficulty at every turn, and consequently they have, as a rule, confined their energies to the describing of the ethereal ideals of the bees'

existence as seen apart from the paltry trivialities that beset the conscientious bee-keeper. And consequently they have produced books which are beautiful and entertaining in the extreme when viewed in the light of a philosophical treatise of the glory of a perfect nature; but when they have been read and re-read, the beginner knows no more about how to keep bees than when he started.

But, on the other hand, much has also been written on the practical side of bee culture, and these authors generally have gone into the subject so thoroughly and exhaustively that the result of their labours presents a mass of details sufficient by their very number to put off anyone who has not the greatest determination to become a bee-keeper.

But, as I have said before, the whole thing is quite easy, really quite simple and quite interesting; it is not dangerous, but is instructive and pleasurable, and, in my humble opinion, the pleasantest of all the many hobbies that a man or woman may take up.

Therefore it is a matter of no little difficulty to so arrange things that the novice shall be both fascinated by the mystery of bee-keeping

as well as adequately instructed in its more practical phases.

Now, I have adopted the following arrangement, which I think will be conducive to the result desired. The book will be divided into three chapters, of which :—

Chapter I., "The Hive," is short, and in it is described the hive and its contents.

Chapter II. will describe "The Bees in the Hive," and gives a short outline of the lives of the queen, drones, and workers; while Chapter III. is called "The Management of the Hive," and deals with feeding, hiving swarms, and the general management of the hive, as well as sections on Honeycomb, Propolis, Wax, etc., and includes a short sub-chapter on bee disease.

As this book, by its size, must obviously be only a manual, many of the more intricate systems and advanced theories, evolved by the advancement of modern ideas and methods in relation to bee culture, will perforce have to be left out altogether. But sufficient of both theory and practice will, I trust, be given to enable the amateur to successfully keep his one or two hives, to give him much useful information, and,

by warning him in time, to prevent many possible failures.

To the professional bee-keeper, or the old bee-father who has spent his life witn his bees, I can pretend to tell nothing. But to the novice, to him who shall be just setting out on that wonderful journey, "The Exploration of the Hive," I hope to offer many useful hints.

The Bee-keeper's Companion

CHAPTER I

THE HIVE

I BELIEVE a great many more people would keep bees if they only knew how simple it is; but it seems to me that by far the greater portion of humanity is possessed with the idea that bee-keeping is a most complicated affair, which requires much time and technical knowledge to carry out with any certain degree of success.

Now, this is not the case at all: to keep bees is just as easy as keeping a canary. But even the keeping of a canary requires a certain amount of scientific application; for instance, it has to be fed, has to be covered up every night, and given water to drink and so forth; and so it is with bees. They rec[illegible]ery little care and

attention; but what care and attention are required must be given them at the right time, or the result will be disastrous. I think that by far the greater number of failures among amateur bee-keepers are to be attributed to the lack of knowledge of the few essential wants of bee life, which leads them to commit mistakes that often end in the most disastrous manner, and which the knowledge of a very few facts would entirely prevent. So in this chapter, which is to deal with the "starting principles," if I may call them so, of apiculture, I am going to take upon myself the responsibility of supposing the reader to be an absolute ignoramus who knows nothing whatever about the subject in hand; so if you happen to be a fairly well-informed individual I advise you to skip this chapter altogether.

Usually, the first difficulty that presents itself to the mind of anyone when desirous of embarking upon some new hobby, or starting some new enterprise of which they know very little, is how to begin. "Where can I get the necessary information that will enable me to start; who can I go to who will explain the first rudiments

of it all to me?" That is the question naturally asked. Many people are desirous to take up bee-keeping, but do not for the simple reason that they know of nobody to tell them how to start. Well, then, how is this information to be obtained? By far the best method is, of course, to find out a bee-man, somebody who keeps a few hives, and go to him and ask him to explain things. Tell him you are interested, and would like to know something about bee-keeping. You need never be afraid of going to a bee-keeper and asking him about bees, for if there is one thing such a man delights in, it is talking about his hives, his honey, and the wonderful things his bees have done and are doing. Bee-keepers, as a class, are a class of talkers. Many hours have I spent with those grey-bearded bee-fathers, talking over the wonders and marvels of their respective colonies. For when the fascination of the hive has got hold of a man, when he has once seen how systematically and earnestly the bees work, when he has once examined a piece of comb made by his own bees in his own hives, when he has once tasted some of his own honey, obtained some insight into the marvellous and mystic forces that govern

the short life of the bee, he is so impressed with the magnitude of it all that there arises in him an interest so strong, and an enthusiasm so great, as to form a lasting impression on his mind and his imagination. All this is not fancy on my part; it is the truth, for I know how I was affected by it myself. I know how the fascination of the hives caught me when I was quite a small boy, and as the wonders of my first hive were revealed, as the whole scheme of the hive's work was daily unfolded before my eyes, and under my own hand; how, when I realised that I could control perfectly the actions of tens of thousands of these little industrious insects, to work my will and carry out my ideas, the whole thing appeared to me the most wonderful of all the wonders I had ever seen. And that influence still has hold of me, and of every other bee-keeper in England. I wish to make a particular point of all this, for I know that if you are to become a bee-keeper it will be the bees themselves that will convert you and make you successful very much quicker and a greater enthusiast than any amount of the best books or lists of apiary details. So I say, if there is a man anywhere round about, go and

see him, and ask him to show you a hive and explain its contents; he will not mind, for he is a bee-keeper, and, as I have said before, no bee-man to my knowledge has ever thrown away even the slightest possible opportunity of talking about his favourite pets. And what will he show you when you do visit him? He will take you to some of his hives and begin to explain. The shape of the ordinary latter-day bee-hive is known to everybody, for they are now common objects all over the country-side. But the bee-hive must not be confounded with the old straw skep which is sometimes to be seen in the rustic apiaries, and is antiquated and useless as far as practical bee-keeping is concerned. The modern hive is the outcome of much thought and scientific invention, and has only been perfected in practically the last twenty or thirty years. It is always made of wood, usually pine, and consists of a series of compartments, the better to enable the bee-keeper to take the honey and properly and healthily manage his bees. There are many different makes or types of hives, all differing from each other in special details, but they all have their internal arrangements the same; and as it is necessary that the

prospective bee-keeper should be familiar with these, I have selected the W.B.C. hive (named after the late Mr W. Broughton Carr, an

FIG. 1.—The W.B.C. Hive. The hive complete as it stands in the apiary.

eminent bee-keeper, and for some time editor of the *British Bee Journal*) as being perhaps simpler in arrangements and more easily described.

The hive illustrated here is, in common with

all other hives, built up in a series of sections, or, as they are called, lifts. These sections or lifts fit one on top of the other and are detachable, so that the bee-keeper may enlarge

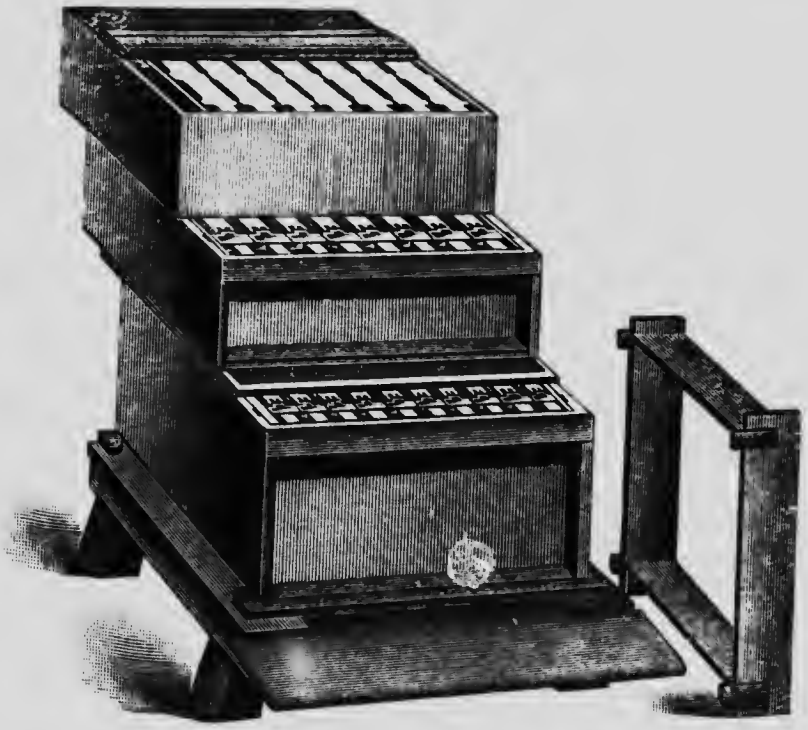

FIG. 2.—The hive without its outer wall, showing the interior arrangement.

or reduce the size of his hive, as the fairness of the season demands. The bottom one of these lifts is usually a square box, containing as a rule ten wooden detachable frames; in each of these frames is fitted a thin sheet of wax

impressed or embossed with the pattern of the bees' cells. These sheets of wax are known as foundations, because they form the foundation or backbone upon which the comb is built up. The combs in this bottom box or section are used for storing honey, as well as for the rearing and breeding of the young bees (of which more shall be said later on). The next section or lift also contains frames similar to the bottom one, but often shallower, and also fitted with sheets of foundation wax, but of a finer quality than that used in the brood chamber.

The honey stored in these frames is usually at the end of the season taken out, extracted from the comb by means of a machine known as an extractor, and bottled. This is known as run or extracted honey. If, however, the bee-keeper is desirous of using comb-honey for his table, instead of the lift or shallow-frame rack, as it is called, he uses a box filled with small square, wide frames called sections, and these, when the bees have filled the comb in them with honey, are ready for use at once. Many of these sections may be seen in any dairy-man's shop who sells honey, often glazed

and decorated to give them a pleasing appearance.

All these three sections of a bee-hive can very plainly be seen in the illustration, and I trust have been explained with clearness. On top of them all comes the roof, and your hive is complete. Of course, as I have said before, there are many makes of hives, and these differ from each other in many minor particulars, but in no substantial way from the one just described.

And so, your bee-keeping friend having pointed out and explained all these various parts, and you having remembered all he has told you, there arises the question (for by this time I am sure you will have made up your mind that at all costs you must keep bees), Which of all the various hives is the best, and where can it be obtained? A very good way of solving this difficulty would be to buy a copy of the *British Bee Journal*, which may be obtained through any newsagent, or ordered from the publishers at 8 Henrietta Street, Covent Garden, W.C. All the best makers of hives and appliances advertise in this journal, and you may be sure

that anything you get from them will be satisfactory. A postcard will bring you their respective catalogues, and, after looking through them all, a choice should be made of a moderate-priced simple hive. Your bee-keeping friend most probably has one particular type of hive in his apiary which he will advocate above all others. I should advise the purchase of one as nearly like it as possible, for, as you will no doubt require his aid at first, he will be of more assistance with the hive he knows most about, besides being immensely flattered because you have taken his advice.

You will also want, to start with, several sundries—a smoker, a simple feeder, a veil, and perhaps a straw skep for taking any swarms with which you may be favoured.

But, when buying bee appliances, remember and not buy too much. This is important. Many young aspiring bee-keepers in their newness and enthusiasm rush off and buy all manner of things for which they have not the slightest use, and which only prove a nuisance and lie about in the way, and are more bother than enough. The fewer the implements, the

better. The few things I have named above are practically essential; and as the smoker, section rack, and veil can all easily be put into the skep, which can be stood away on a shelf in the outhouse when not in use, there is nothing to lie about or get lost.

There is nothing more annoying than to be suddenly called upon to attend to the bees, either to catch a swarm or render them some assistance, and then in dismay not be able to find the veil. I have known this sort of thing happen frequently; and, as I said before, bees must have attention when they want it. The hiving of a swarm without a veil, unless you are a very old stager, and have become thoroughly inoculated to bee stings, will undoubtedly leave visible impressions on your physiognomy for the next week. Bee tackle must be kept handy and ready for use; in fact, it is a good plan to keep a veil and a smoker in the roof of your hive above the section rack, so that it is always to hand when you want it.

Having selected your hive, which should preferably be painted (many people I know use unpainted ones, but the paint undoubtedly preserves the wood, besides adding very considerably

to the appearance of the hive), the next thing is to procure the bees themselves. There are two different ways this may be done. You may start with either a swarm or a stock. A swarm is a large number of bees which have just set out from their old home to form a new one by themselves (see Chapter III.), while a stock is the old-established community they leave behind them. I should most certainly advise starting with a stock. It will cost you more if you have to buy it, but it will be well worth the extra money. For a swarm—especially if it be a fairly early one — is generally quite able to look after itself, and will often reach the end of the season with quite a respectable surplus of honey. It is not so safe as an old-established stock. A bad season may leave them short of food, which would necessitate careful feeding. If from any circumstance the queen should die, it would take them some time to breed another and build the necessary comb. A stock, on the other hand, is much safer. It has passed through all the dangers and set-backs that await the young and hopeful swarm. It has a good store of honey in the lower frames, and can be reckoned upon to

do well. So you cannot do better than get a good, healthy, strong stock. Pay particular attention to the health question. If you buy your bees from any of the reputable dealers, you may be quite sure that they will not let you have unhealthy bees. But, if you are getting them from the country, especially if they come from the apiary of some rusticated, old-fashioned bee-keeper, it is as well to have them examined by a competent man to make quite sure. Do not think, because I ask you to take this precaution, that bees are creatures who are very much subject to disease. They are not. Disease among them of any kind is a comparatively rare occurrence; in fact, there are many districts where it has practically never been known. But when you are starting you want everything right; you want healthy, strong, vigorous bees, and it is as well just to take the precaution to see that they are so. For if you make a start with perfectly healthy bees, you may be pretty sure that you will never be troubled with any serious disease.

There is only one more question that need be discussed here, and that is which particular breed of bees is it advisable to start with. Well, there are three different kinds or breeds

of bees commonly found in English apiaries; they are the Black bee or native English, Italian bees, and Hybrid bees.

If your stock comes from the country, from an old-fashioned bee-keeper, the chances are that they will be English Black bees. These are as good as any; they are good workers and fine honey-gatherers, and are perhaps better suited to the vagaries of the English climate than any of the others. They can be easily distinguished from Italians or Hybrids by their colour, which is darker — hence their name.

Italian bees are more brightly coloured, having yellow bands round the abdomen, and are kept by many people because of their superior appearance, and also through the belief that they are better honey-gatherers; but I have never found them do very much better under ordinary conditions than Blacks or Hybrids. They can be obtained from any of the well-known dealers, and are dearer than the other varieties.

The Hybrid, a cross between the two breeds previously described, is perhaps the best of all three, for, like all other mongrel or hybrid

animals, they seem to make up in hardihood and work all that they lose in elegance and pedigree. They are the most common, and are to be found principally in those parts of the country where many bees are kept. They are good, hardy, energetic insects, fine honey-gatherers, and the price of them is considerably less than Italians.

So I should advise you to make a start with either Blacks or Hybrids—it doesn't matter much which; and with a good hive and a strong and healthy stock, given a fine season, your success is practically assured. I can tell you that after your first season, after you have once taken your own honey from your own hives in the autumn, the love of bee-keeping will come over you, and you will remain a bee-man for the rest of your natural life.

So suppose you have your hive, and it is set up in a favourable spot in the garden. Your bee-keeping friend has gone home, after showing you practically how everything is managed, and you are left to yourself. You then commence investigations into the why and wherefore of bee life; you begin to find out some of the mysteries of bee existence, and solve some of the problems

that all bee-keepers are called upon to solve. Then it is that you come to the most interesting and delightful chapter in the whole of this wonderful history, which for the sake of convenience I have named :—

THE BEES IN THE HIVE

CHAPTER II

THE BEES IN THE HIVE

HAVING described the elementary procedure, and having come to the more intricate portion of my work, I would like all the well-informed individuals who have skipped the previous chapter to read this one. I would say: "Come in now, for I have something to tell you; yes, something that I venture to think that even you do not know all about, and something that (as the man who writes to you for advertisements would say) will be sure to interest you." The work that goes on in a bee-hive, the organisation and economic systems employed by the bees to work out the complicated and innumerable details of their short though busy lives, have been a puzzle and a marvel to man from the earliest ages. Not all the regime of hive life has as yet been discovered; much remains for the scientific observer to examine

and record. But what has been found out is so varied, and I might perhaps say complicated, that it is a task of some difficulty to find a way of simply and plainly describing it all so as to make it understandable to the uninitiated. So too I have adopted a way which I must confess is somewhat original, but which I think sets the whole matter out clearly, and will not cause undue confusion. As everybody, I think, knows, the hive contains three entirely different kinds of bees, namely, the queen, workers, and drones. These between them make up the history of bee life, and so as to give the reader a clear idea of the part each of them plays in the management of the hive, a separate sub-chapter has been allotted to each. Then, when each of their special functions has been described, their combined and united labours will be dealt with. First we will take the humblest, ablest, the most important and most essential of all of them—

The Worker

The worker bee, the bee that does all the work, gathers all the honey, and in fact runs the whole hive, is what most people know as

the common bee. She (for its gender is feminine) is the bee one sees in the flower and on the fruit blossom, and she is also the bee that stings, so no difficulty need arise in distinguishing the worker from the rest of the inhabitants of the hive. The worker it is who forms the wax and builds up the combs, who rears the young bees, feeds and looks after them, cleans out the hive, and is in fact

FIG. 3.—Worker Bee.

complete mistress and ruler of the whole colony. Realising, therefore, the important part she takes in apiculture, we will give a short history of her life from the beginning.

She is hatched from an egg laid by the queen bee in a cell made by other workers. The first of these eggs are laid in the early spring, according to the clemency and forwardness of the season, and three days afterwards the worker comes forth from the egg in the form of a small and delicate little white grub or caterpillar. Still living only in the cell in

which she was hatched, this small grub lies still and eats food supplied by other workers, and grows, until after about nine days it is so large as to almost fill up the cell in which it lives. Then follows the chrysalis stage; the mouth of the cell is sealed over, and the whole soft, delicate grub slowly transforms herself into a full-grown, perfect bee, which transformation usually takes about twenty-one days. Then, eating her way through the waxy capping of her cell, she comes forth into the world weak and languid, but a perfect bee. For some time she wanders aimlessly over the combs, ignored by the rest of the workers; then when she has gained sufficient strength and begins to know her way about the hive, and becomes accustomed to her existence in the world of activity, she is set to work on the light task of looking after her sister bees and feeding the young grubs. After a time, when this indoor occupation has become monotonous, a desire for a wider and more varied existence takes possession of her, and she issues forth on her first journey in quest of honey. Once becoming a honey-carrier, once having seen the green fields and the flowers and the sunshine and

tasted the nectar from the many flowers, the desire to work, the all-absorbing determination to gather the maximum amount of honey before the flowers shall fade and the sunshine fail, takes absolute possession of her, and henceforward, from morning till evening, work, work, work, among the clover and the honey fields, is the sole ambition and object of her life. But the little body cannot stand the strain of such labours, and day by day, as with battered wings she brings her little honey-sack full of nectar to the parent hive, her strength fails, until one evening, unable to sustain her head, worn and broken with incessant toil, she falls down into the grass before the hive, and, crawling away out of sight, dies among the clover roots, uncared for and forgotten amid the rush and tear of the busy hive.

Such is the brief existence of the worker bee. In summer time, in the height of the season, when the honey is plentiful and there is much work to be done, she will not live more than six weeks; only the bees born in the late autumn, when the flowers and blossoms are over, live on in the hive in silent waiting

for the warm sunshine of the following spring to start again the life of the new year and rear the first batch of young bees to perpetuate their unceasing industry.

THE QUEEN

Everybody, whether he be bee-keeper or not, has heard of the queen bee. One is told of her in story and fable, and the fact of her existence is known to every child before he

FIG. 4.—Queen.

has learnt his first batch of nursery rhymes. Yet, although everybody has heard of her, and knows of her existence within the hive, comparatively few people have ever seen her. Whenever I show any friends of mine a hive of bees, the first question they always ask, on being shown a comb covered with the little

inhabitants, is: "Where is the queen? Oh, do point her out to me!" And when I was a small boy it often used to be my duty to go to various agricultural shows and exhibitions

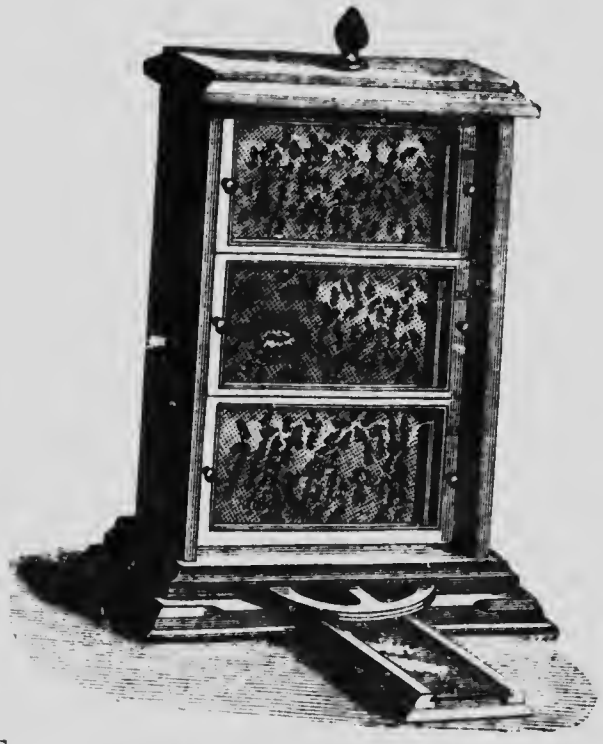

FIG. 5.—Observatory Hive. The queen can easily be distinguished in the middle frame.

in charge of an observation hive, when I would stand beside that hive all day long and do nothing else but point out the queen to the ever-interested, inquisitive crowd of people who gathered round. Yes, everyone is interested in

the queen, and before you have been keeping bees very long yourself, you will have the pleasure of pointing out her majesty to any of your interested friends who may be desirous to have the workings of the hive explained to them.

With a little practice she can be easily distinguished from the rest of the inhabitants of the hive, for her body is longer and the abdomen more pointed, while her head is slightly smaller than that of the worker bee. She is to be found in the bottom part of the hive among the brood, busily engaged in her unending task of egg-laying; for she is, as no doubt you already know, the mother of the whole hive. By her is laid every one of the tens of thousands of eggs from which the inhabitants of the hive are hatched, both drones and workers as well as the future queens.

Her life, although she is so essential to the community, and so necessary to the existence of the hive, always seems to me rather a sad and melancholy one.

Hatched from an egg which, when it is laid, is to all appearances, and has proved, as far as

scientific examination can determine, to be identical with that from which the worker is produced, the little queen grub is very carefully and diligently nursed by the workers. The cell in which the grub is hatched is enlarged until it occupies about four times the space of the ordinary worker's cell. These cells are usually made on the edges of the comb, so that their extra size and height may not interfere with the general regularity and conformity of arrangement of the combs. In this spacious cradle the little white larva, which is destined to be the mother of almost countless hosts of industrious workers and lazy drones, is fed and pampered with a special rich and delicate food given her in such quantities by the ever-watchful nurses as to inundate the cell, and in which for some portion of her life she positively floats.

The action of this food, which is known among bee-keepers as royal jelly, and the spacious accommodation provided by the extra large queen cell, produce most wonderful changes in the formation of the grub. For when, after a period of incubation, which is considerably shorter than that occupied by the

worker, the young bee eats its way out through the capping of its cell, it comes forth a perfectly formed queen.

And here it is that the amateur stumbles across the first of the many mystic problems that are to fire his imagination and his reasoning before he arrives at the end of apiculture.

The process by which this egg is made by the bees themselves, without any aid from the mother bee, to become either worker or queen, just as they please, is a process the inner workings of which, it may be said, have never been discovered. A few outside facts that produce this wonderful result we can observe and describe, and these facts are: we see that, when the bees wish to breed a queen, the cell in which the egg is laid is, as we have mentioned before, considerably enlarged, and shaped differently from the ordinary worker's cell, being rounded like an acorn when sealed over, instead of flat, and also losing its hexagonal appearance. We also know of the existence of the special food known as "royal jelly," with which the intended queen is fed while still in the larva stage. We

see the cell enlarged ; we know of the superior, refined food ; and then, when the time of incubation has expired, we see the perfect queen come forth. Beyond these few simple facts we can only imagine and conjecture : science has revealed nothing more.

And so, after about seventeen days, the young queen, weak and frail, comes out of her cell and into the world of business and work. What are the duties that await her there? She is to become the mother of the whole hive, and on her alone is to devolve the duty of perpetuating the life of the colony. Her first thought when among the workers is to see if there are any other aspirants to the queenly office who may not yet have been hatched out. For the bees take no risks, and always build more than one queen cell, so as to make certain and leave nothing to chance. Therefore the young queen usually finds two or more other queen cells in which the young queens are just ready to eat their way out. Upon these she makes a furious assault, often assisted in her malcontentions by the bees themselves, who, regardless of sentiment, and placing no value whatever upon individual existence, realising that the one queen

now hatched is sufficient for their requirements, have no scruples as to murdering all the others, who, if hatched, would only prove a nuisance to the smooth running of the community. Sometimes, however, two young queens hatch out about the same time, in which case they almost invariably meet and fight the matter out between themselves, the victor being she who will first manage to thrust her curved sting into her antagonist's body.

The victorious queen, then, having either killed all the young queens or destroyed them in their cells, is now mistress of the situation.

Here, no doubt, the observant reader will remark, "Yes, but what has happened to the old queen, the mother bee who laid the egg from which this new sovereign is hatched?" The old queen, when she sees about her queen cells being built, and the bees busy administering the royal jelly, makes up her mind to leave the hive, and so she leaves it in what is called a swarm; some of the bees elect to go with her to start a new home somewhere else. But the swarm will be described later on, so we need not go into it here.

Therefore, when the young queen is hatched the old one is already away, starting a fresh home in pastures new.

Only one more thing remains now to be done before she enters upon her duties of motherhood, and that is to mate with the drone. And so one fine day, a week or so after she has been hatched, she comes out from the hive, and spreading her strong, elegant wings, after taking a few shortish flights round about the hive to get her bearings, flies away up into the deep blue of the summer sky. In a short time, about half an hour as a rule, she will return, having met the drone. Then she enters the hive, from which she will not emerge again until, finding herself superseded, and other young queens about to hatch out, she leads out a swarm as her mother did a day or so before she was born.

Such is the life of a queen. The whole of her long life—for a really good queen will live three or four years—with the exception of the short wedding flight, as it is called, and the time that she leads forth her swarm, is spent within the four walls of the hive, often in perfect darkness, doing as the bees bid her,

a slave to her own motherhood. It is a sad life. There is no honey-gathering or bustling work among the flowers and the warm sunshine, such as falls to the lot of the energetic workers. There is not a moment of that rest or relaxation that forms the whole life of the lazy, idle drones. Yes, great as may be her necessity, essential as may be her presence, long as may be her life, I do not envy the queen, the sad and silent mother of thousands and thousands of busy, restless children.

THE DRONE

The drone is the male bee. In size he is slightly larger than the worker, and bigger

FIG. 6.—Drone.

round the thorax. A great, unwieldy creature, he may easily be detected by his loud buzzing, which is much more sonorous than that of any

of the workers, and his awkward, clumsy ways. Hatched from an egg which is laid in a cell larger than the worker's cell, but not so large as that of the queen, he passes through all the stages of larva and chrysalis, and in about twenty-four days from the time of hatching he eats his way out into the hive. There he lives a life of absolute idleness, doing nothing whatever towards the upkeeping of the community. He feeds just as it pleases him from the honey brought home by the willing workers, whose work he hinders in no small degree by his bulky presence and his clumsy manners.

Nature, in her endeavours to make absolutely certain that the young queens shall not be wanting for a mate, leaves nothing to chance, and so many hundreds of these idle, useless drones are bred in the hive each year, making a considerable drain on the precious store of honey that the workers have so laboriously gathered. You may also see the drone on fine summer days buzzing round the flowers, from which he cannot get any honey, because his tongue is not long enough for that purpose; and you may without fear pick him up and

closely examine him, find he has no sting, and beyond a loud buzz, which sounds dreadfully dangerous, he cannot harm a fly. Of course, as the drones outnumber the queens by many hundreds to one, the vast majority of them never meet the queen at all, and those who do, the largest and strongest of them, who by their swiftness of wing outdistance their companions in the rush after the young queen as she flies up into the blue of the June sky, the act of impregnation instantly kills. And their shrivelled, shrunken bodies fall down into the grass, forgotten and uncared for.

You will know enough of the instincts and habits of bees by this time to be sure that, in their rigid demand for economy, they would not countenance the existence of any useless, idle encumbrances upon their stores and combs for one moment more than is absolutely necessary; nor do they, for when the summer is waning, as the mists of autumn rise, and the young queen has returned to the hive, the drones are no longer necessary to the community, the bee, impelled by a force which it is difficult to denominate altogether as in-

stinct, rises up and massacres the whole tribe of the cumbersome drones. Each one of them as he returns to the hive is ruthlessly killed, and his dead body flung outside to rot among the grass at the entrance; and in the twilight of the late summer evenings many hundreds of them may be seen lying stark outside the hive that once afforded them such a luxurious and easy existence.

All through the winter, not a single drone lives in the hive; and only in the spring, when their presence again becomes necessary for the propagation of the race, are more of them reared—only in their turn to be massacred as their fathers were before them.

I should like to have given much more space to describing the lives of the bees, but the limits of this book prohibit it; and these short descriptions of the lives of each of the three kinds of bees that inhabit the hive, and the parts they each perform in the curriculum of bee existence, have been mentioned simply to give the reader sufficient information to enable him to distinguish them one from another, and know the principal objects of the existence of each of them.

Chapter III. is of much more importance to the beginner, so he should read it carefully, for on his acting up to the hints given there depends to a very large extent his success or failure in bee-keeping.

CHAPTER III

THE MANAGEMENT OF THE HIVE

NECESSARY APPLIANCES

I ALWAYS find that whenever I read a book, especially a text-book, upon any subject with which I am not perfectly familiar, as soon as the author begins describing the technicalities of his subject, I am more or less completely at sea regarding his meaning. I do not wish for one moment to insinuate that you are as thick-headed as I am; but when one person happens to know the various implements or parts of any particular machine, he is only too apt to suppose that everybody else must be more or less acquainted with the subject just because he is familiar with it himself—a course of proceeding which often involves the reader of his works in a maze of misinterpreted and unappreciated facts.

And so, with the object of preventing such

an unfortunate state of things occurring here, I have added here a short list of the principal implements and appliances necessary to the amateur bee-keeper, and have also each of them illustrated, so that if you will read them through carefully, it may save much reference and simplify the task considerably later on.

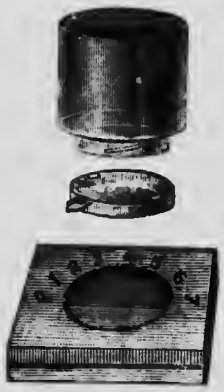

FIG. 7.—Bottle Feeder.

FIG. 8.—Tin Feeder.

The Feeder (fig. 7).—The feeder will not probably be among the first of the few appliances you will have to buy to make a start with, for if you get your stock, as will most probably be the case, in the late spring or early summer, there will be no more feeding required until the autumn; but nevertheless it is a thing that you will most undoubtedly find yourself obliged to get when the time comes.

It is often found advisable, with the object of stimulating the activities of bees, to feed them at certain seasons of the year. In the spring, when the colony is just awaking from its long winter rest, the bees are fed, with the object of encouraging them to rear young bees much earlier than they would do in the ordinary way, enabling them to secure a bigger honey crop.

Feeding is also resorted to in the autumn by some bee-keepers who have taken all the honey out of the hive, as a means of providing the bees with sustenance for the winter; but the practice of taking all the honey is generally admitted to be bad economy, and is not practised by experienced bee-men. The food given to the bees is in the form of syrup and also sugar cake, and in the former case it is administered to them in what is known as a feeder.

There are many different kinds of feeders on the market, and all of them have their meritorious points; but for the small bee-keeper, whose ambitions do not exceed a hive or two, the one illustrated is, I think, as good as any.

This is made, as you will see, of a glass jar somewhat similar to a jam-jar, upon which fits a tin cap, in the top of which several holes (usually seven) are pierced in the form of a semicircle. This is then turned upside down upon a wooden board specially prepared for the purpose, and which has a hole in it of semi-circular shape which just fits the metal cap of the jar. Printed on the wood round the hole are a series of figures so arranged that when the pointer that is fixed to the metal cap points to any particular number, the corresponding number of holes in the top are exposed over the semicircular hole in the wood. When the feeder is required for use, the glass jar is filled with syrup and fitted with the board, which is stood down in the hive on the top of the brood frames, and by regulating the pointer the number of holes are exposed through which the syrup is available to the bees, who may thus be allowed as much food as the occasion demands.

This is a very simple feeder and extremely easy to manage, and is, I think, best suited to the amateur; of course, there are many others, but it would take much space to describe them

all. As time goes on and you hear more about bees, you will naturally meet with these other varieties and then be able to test their respective merits for yourself.

The Smoker (fig. 9).—Another indispensable accessory to the bee-keeper's outfit is of course the smoker, which is used to quiet the bees and

FIG. 9.—Smoker.

so render them less liable to sting. It consists of a tin barrel fitted with a bellows attachment and a conical end with a hole at the top. In this tube is placed the fuel, generally consisting of brown paper, old sacking, or anything that will burn with plenty of smoke. This is set alight, the pointed end up-raised, when, as will readily be seen, by manipulating the bellows

smoke is blown out of the hole in the end of the smoker.

The smoker is used whenever it is desired to manipulate or examine the bees, when taking honey or hiving swarms. The effect of the smoke is to frighten the bees, who, when frightened, contemplating some destruction to

FIG. 10.—Wire Veil.

their home and precious honey-store, go straight away and with most practical frame of mind fill their honey-sack to the utmost, so that if disaster comes they will not be altogether destitute.

Thus, having a heavy load of honey, the bee is less inclined to sting than ordinarily.

The Veil (fig. 10).—The veil also the amateur will find it impossible to leave out of his

collection of appliances; it is perhaps the most essential of all accessories. It is made simply of netting fitted at the top with an elastic band to fit over the crown of the hat, while the lower ends are tucked away under the coat. Of course, its object is to protect the face from stings, which it does very effectively and well.

Veils are made of several different kinds of net, but a black one should always be selected,

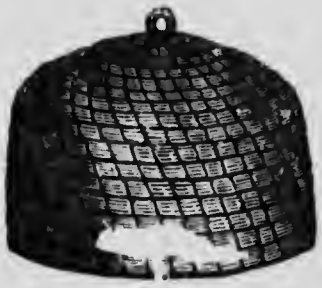

FIG. 11.—Straw Skep.

as white veiling, if subjected to any constant use, causes a bad strain to the eyes.

Some veils are also made with wire netting face-pieces. These, although rather more expensive than the plainer veils, have many advantages. The stiffness of the wire netting makes them stand more away from the face and not blow against it; also they are, I think, much better to breathe through. I should

recommend a wire veil, therefore, as being safer, as well as more pleasant to use.

The Skep (fig. 11).—The skep may be described as a kind of straw basket without a handle. It is used for hiving swarms, sending bees away in, and makes a very good temporary hive. It used, in fact, to be the only hive known to our forefathers, and the bees used to live in it and fix their combs against the sides; but the advent of modern apiculture has, of course, entirely displaced it as a hive, in which capacity it is only seen in the most rude and antiquated apiaries; but it has many uses to the English bee-keeper, who should always keep one handy.

The Extractor.—This is the machine used for extracting the honey from the combs at the end of the season. It is worked on the principle of centrifugal force. The honeycombs, after being uncapped, *i.e.* having had the cappings of the cells shaved off with a sharp knife provided for that purpose and known as an uncapping knife, are placed in a cage fixed to an upright shaft in the centre of an iron cylinder. This shaft is then caused to revolve at a fairly rapid rate, when, as before mentioned, by the

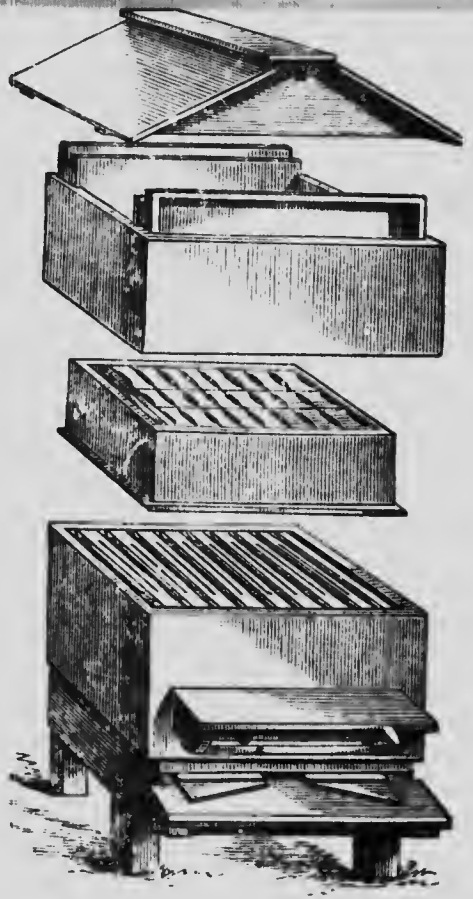

FIG. 12.—A Cheap Hive. Containing body box and lift deep enough for two racks of sections.

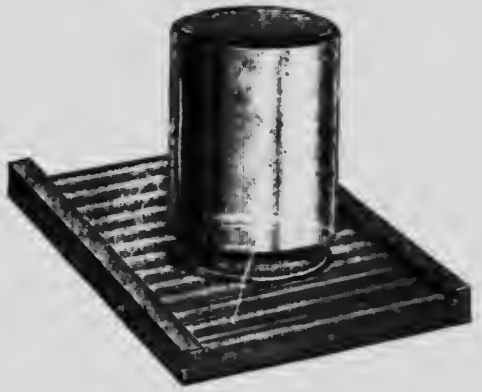

FIG. 13.—Bottle for supplying water to the bees in dry weather, or when no natural water is available for some distance. The bottle is filled with water and turned upside down on the corrugated board. The water fills the corrugations, when the bees can easily get at it.

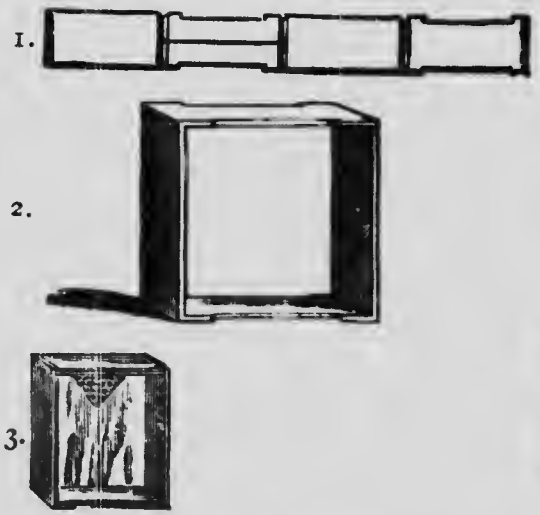

FIG. 14.—The Section.

1. Section in the flat.
2. Bent round and fitted together.
3. Complete section with starter of foundation wax.

FIG. 15.—W.B.C. Section Rack.
Showing section frames to prevent sections being soiled by propolis.

action of centrifugal force the honey is thrown out of the cells against the sides of the cylinder, when it is drawn off through a tap at the bottom. The extractor is a big, clumsy machine and, unless a large number of hives are kept, is not worth having, more especially if the bee-keeper, as is most often the case among amateurs, prefers to take the section honey, when of course there is no need for it at all.

GENERAL MANAGEMENT

Having described in previous chapters the hive and its inhabitants, all that remains is to learn how to keep them healthy and well, and obtain the best results at the end of the year in the form of honey. In dealing with this part of the subject there are a few things to be remembered that are of vast importance, and should be taken as axioms.

First, remember that bees do not want much attention; too much is bad for them and upsets the continuity of their work; *but when they do want attention, they must have it.* This is imperative: negligence to feed them at the proper time may cause most disastrous results. I had a case myself when I was a boy at school.

Before the winter came on I had examined a hive and found that the bees had plenty of food to go on with, but would require some more feeding in the early spring. I made a mental note of the fact, and, as usually happens to my mental notes, forgot all about it. One day in the spring, whilst walking round the garden, I noticed that the early flowers were out, but there were no bees about; then it suddenly occurred to me about this feeding business. I went to the hive and found all silent and dead, the bees starved after having eaten the last drop of honey.

This made a great impression on me, and I make an important point of it, for I have frequently found the same thing happen with other amateur bee-keepers. They take all the honey away from their bees in the autumn, and then forget about the feeding when spring comes round.

The next thing to remember is, when handling bees, always to go about it slowly and deliberately, not in a hurried, jingling manner. A halting and hasty manner flurries the bees and makes them angry and frightened, and when a bee is angry or frightened she makes as

loud a buzzing as she possibly can, and at once sets about trying to find a soft spot whereon to plant her sting. But, on the other hand, if handled calmly and with careful deliberation, bees are the most docile creatures imaginable. I had an old bee-keeper come who thought nothing of picking up a handful of his bees and putting them alive into his mouth, then opening his lips and letting them crawl out on to his face and fly away. One wants to be a genius in calmness to use them like that without getting stung, and I only mention the fact as an exaggerated instance of how docile bees can be when properly handled.

Another point to remember is, when you are handling or manipulating bees, always to stand *behind* the hive, *never in front.* The bees come out of the hive at the front, and if you are standing in the way—well, you must not complain if you get stung. So always, if possible, approach and work a hive from behind.

Only one other point, I think, might be mentioned here. Always, if possible, attend to your bees on fine, warm, sunny days, and as near the middle of the day as possible. Many

people whose business takes them away from home all day have to leave any attention their bees may require until the evening. This is bad, as bees always seem to rest as soon as twilight arrives, and consequently at that time there are always more bees in the hive, besides the chance incurred by letting the cold evening air into the hive, which is bad for the young brood. If, however, it is desired to move the bees to a different apiary, this should be done in the evening, when all the inmates of the hive have returned, and consequently none are lost through coming home and finding the hive gone.

The foundation of a successful bee-keeper rests on the understanding and acting up to these few simple maxims.

Now here it is that we come upon the serious side of bee-keeping, the practical part, the part that must be learnt, and learnt properly and carefully, by all who would succeed in the apiarian art. We have so far learnt how to talk about bees, how to think about them and, in our imagination, to be wonderfully successful with them; we will now learn how to keep them.

The spring, which opens the bee season, and sees again the reawakening of life within the four walls of the hive, is an anxious time for the amateur bee-man, and he must be careful indeed that everything is in order, for on a good start depends a good ending, and any mistakes or oversights at this time might very seriously affect the welfare of the hive throughout the season. Towards the middle of March, if the season be fairly early, the bees will be seen in the garden, flying among the early spring flowers, although perhaps on a fine day at the end of February a few of them may be noticed, buzzing round the foremost crocuses; these are not working in earnest, but have availed themselves of the mildness of the weather to take what is technically termed a cleansing flight. As soon as they are seen to be about to set to work in earnest, the hives should be examined, and special attention paid to the condition and amount of the food left in the brood nest.

FEEDING

Some bee-keepers take away all the honey from their bees in the autumn, in which

case, of course, it is necessary to keep the feeders living practically the whole winter. But this is an ill-advised thing to do, and I can assure you that you will very soon find it cheaper and better to leave the bees all the honey that has been stowed in the brood cells, taking for yourselves that only from the shallow frames and sections. If upon examination the food-supply is found to be getting low, then it is advisable to feed the bees.

The reason why feeding is resorted to is very simple. A good supply within the hive induces the queen to commence egg-laying earlier than she would do in the ordinary course of things, when she would wait until the season was so far advanced as to make certain of the necessary food for the young brood being obtainable. This early laying on the part of the queen naturally results in a large number of workers ready to take all the advantages of the first honey crop. Especially is this feeding important in those districts where fruit blossom is plentiful. Cherry or plum orchards in the near vicinity of hives are great assets to the bee-keeper, and if the weather be fine during the time that the blossom is in full bloom,

he may even get his first sections filled before the end of May. There are many stories among bee-keepers about the extraordinary yields from fruit blossom in favourable years, many of them no doubt very much exaggerated; but my father on one occasion took 40 lbs. of honey off one hive on the 10th of May. This is very exceptional, and has only occurred once in the course of many years' experience, but it shows the possibilities and importance of fruit blossom to the bee-keeper. And it is advisable to feed the bees well in the early part of the spring, so that they may be strong and well supplied with energetic young workers to take full advantage of any luck the weather may bring them in this respect.

Method of Feeding with ordinary Bottle-Feeders.—With regard to feeding, a few words may be useful, as to how exactly the operation is performed. The easiest and simplest, if an ordinary bottle-feeder is used, as described on pages 50, etc., is to cut three sides of a square hole in the piece of ticking or whatever material is used for covering the wood frames, a little smaller than the wooden bore of the feeder; fold this back, and then place

the feeder over the hole. The reason that it is advisable to cut the hole a little smaller than the feeder itself is because, if it is cut too large and is not completely covered by the feeder board, the bees will get up into the roof and starve.

Having set the feeder thus, the whole thing, bottle and all, should be covered up with a piece of old carpet or some other such material to ensure warmth.

This feeding should not be continued too long, for, as soon as the bees have as much as they can accommodate in the brood cells, they will want to enlarge their hive, and it becomes necessary to give them more room; so if the season be good and the bees flying well, the examination of one of the brood frames will tell you the state of things, and this, coupled with the meteorological conditions, must determine your actions in this matter.

Enlarging the Hive.—As soon as the feeder has been removed, the hive must be enlarged, and rather more space in it must be allocated to the bees. This is done, as already explained, by the addition of certain sections or frames fitted with comb foundations, and specially prepared

for the reception of honey. If it is your desire to get comb honey from the bees, you will use a section rack; if, on the other hand, run honey is required, a shallow frame rack should, of course, be used. Whichever of these you should desire to use should be placed on top of the brood chamber, after first removing the cloth cover.

Some people put on both shallow frame and section rack at the same time, the frame underneath as a rule. This is a very good plan if you have not much time to attend to the bees, for it gives them ample accommodation, with no fear of overcrowding.

As before mentioned, the fruit blossom in most districts forms the first of the series of honey crops to which the bee-keeper looks to make up the measure of his season, after which come the more important ones, the clover and the limes.

The honey gathered from these two sources makes up the majority of the season's takings, and on the conditions of the weather and the bees themselves, therefore, much depends, and the end of May or the beginning of June should see the whole colony head over heels at work;

and with the work for the bees comes work for the bee-keeper also, for if the stock is strong and the meteorological conditions fair, the bees will probably swarm.

THE SWARM

In the chapter on the queen bee, swarming has been mentioned, but only in a casual manner, and as it is one of the most important features of the bees' existence, we will give here a fuller and more accurate account of its happening.

The limited space in the brood cells about this time of the year becomes congested to a degree that demands attention. The queen, if she is a fairly prolific one, will have filled up all the cells allotted to her with eggs, and therefore, as can easily be seen, an extension of premises becomes essential.

This is accomplished, as we have said before, by the old queen going out of the hive, accompanied by a certain number of workers, to start a new home in a more commodious and less congested spot. It seems fairly evident that the bees are aware of this intention on the part of the queen to swarm some considerable

time before she does so, and they at once commence erecting queen cells. Usually these do not exceed three or four, but sometimes half a dozen or more are built upon the edges of the combs, and the young queen reared, as described in Chapter II.

Then it is that the phenomenon known as the swarming fever comes over the hive. An air of bustle and excitement pervades the whole place from roof to floor-board, and the bees themselves give voice to their excited feelings in a particularly loud and easily distinguished buzz. Whether the idea of swarming emanates from the queen or from the bees themselves has never been clearly proved. For many years apiarists were of opinion that the old queen, seeing the other young ones about to hatch out, went away with the swarm of her own accord. Observations, however, seem to prove that the queen is among the last to leave the hive, which would rather disprove the supposition that she is the leader of the swarm, and would seem to indicate that the whole thing is organised by the bees themselves. What is most probably the case is that the swarming fever takes possession of

the whole hive, queen and workers alike, and they come out by a sort of mutual consent.

The bee-keeper may easily detect if his hive is about to swarm by several other signs besides the buzzing before mentioned.

The bees in the hive about to swarm will be seen to be doing much less work than ordinarily, few coming and going, while large numbers will cluster round the entrance, as if waiting for the queen to come out. This crowding outside is the most easily distinguishable of all the swarming signs, for sometimes so many bees will hang outside the entrance as to form a good-sized cluster. When this state of things occurs the bee-keeper should see that he has everything ready for hiving the swarm which is soon to make its appearance, a multitude of bees coming helter-skelter out of the hive into the air. The swarm flies round and round for a few moments as if to get its bearings, and then settles upon some bush or tree in the near vicinity. While settled here it seems that plans are made for the future home—in fact, observant bee-keepers state that a certain number of bees are despatched as scouts in

various directions, whose business it is to search round, with the object of discovering some suitable place in which to start a new home. After a while these bees return, and report progress. Whether this is the case or not I cannot say, as I have never observed the actions of a swarm so closely myself; but certain it is that after a short rest wherewith to receive the reports of the scouts before mentioned, and recover from their excitement, the whole swarm again takes wing and, rising up into the air, flies away.

So the bee-keeper, if he wishes to secure his swarm, must do so while they are taking this short rest; and therefore it is necessary that he should have everything ready, for any delay in having to look for the veil or the skep may result in the loss of the swarm altogether.

Hiving the Swarm.—To the experienced beeman the hiving of a swarm is a simple and easy affair; but to an amateur things are different, and especially if it be the first one he has had to tackle, he will no doubt feel considerable nervousness as to whether things are going to turn out right.

It is advisable to take a few lessons in this department of apiculture before attempting it on one's own account, for if we have assisted on such occasions before, we know how to get along better than all the books in creation could explain.

Hiving a swarm, of course, consists of getting the bees into a hive, and to do this it is necessary first to get them into a skep, from which they are to be transferred to their future home. The first of these operations is simple enough, for by putting the skep underneath the swarm, and smartly jerking the branch upon which it clings, the bees fall down into the skep, which is then covered up and carried to the hive. But bees have, however, an awkward way of swarming in out-of-the-way and inaccessible places, and then it is that difficulty is experienced with the skep. It is sometimes necessary to cut the tree at the end of a branch before the bees can be released, or they may swarm in a small thick shrub such as a gooseberry bush, in which case it is, of course, tiresome and awkward to get them into the skep, in consequence of the number of small branches and foliage that intervene. But the

garden of the average amateur, containing as it does, as a rule, only small fruit trees, and nothing in the way of tall and straggling plants, offers little difficulty in this direction, and any swarms that may come out he will be able to take without much difficulty.

Having got the bees into the skep, the next thing to be done is to get them to enter the hive, which is accomplished after the following manner.

In front of the hive is placed a board or any other suitable substance, the whole width of the hive, one end of which rests on the ground or is slightly raised from the ground on a couple of bricks or any other convenient material; the other end of the board is rested upon the alighting board of the hive, thus giving a broad inclined platform sloping up to the entrance of the hive. Upon this platform the skep containing the captured swarm should be turned upside down, and the bees emptied out, when they will at once commence running up to the highest part of the board, which is against the entrance, and into the hive. The judicious use of the smoker may be necessary to keep them from wandering off

the board, and to lead them in the right direction.

As soon as the queen has entered (and the bee-keeper should very carefully watch her and make sure she is in) the rest of the bees are sure to follow.

The new hive should be prepared and provided with frames fitted with foundations or starters, and a very excellent plan, if possible, is to take a frame of unsealed brood from one of the other hives in the apiary and place it in this hive. The bees will never desert brood, besides that it gives them a start in their new home and provides the queen with some finished cells in which to commence egg-laying.

Looking after the Swarm when hived.—There is an old saying which everybody knows, to the effect that:

> A swarm of bees in May is worth a load of hay,
> A swarm of bees in June is worth a silver spoon,
> A swarm of bees in July is not worth a fly.

Now this adage, although exaggerated in the value it puts upon a swarm of bees, nevertheless gives a very fine idea of the position.

A swarm that goes out in May, when hived,

has all the season before it in which to gather honey and compile enough stores to last it through the coming winter, and so, if the season is good and the honey crop up to the average, it may be reckoned upon to develop of its own accord into a fine strong stock by the middle of the summer.

A June swarm, however, has missed much of the blossom and clover, and unless things are very prosperous it will require a little looking after; it should be allowed to keep any honey it may gather to serve as winter food, and if the season is bad will probably require a little autumn feeding.

If you have, on the other hand, a swarm come out in July or the late summer—a thing that often happens if the spring weather has been unfavourable and honey scarce—it will have to be very carefully fed to make sure it does not die of starvation. The frame of brood spoken of earlier should be given it, and if possible a frame containing some gathered honey, while it may be advisable to use the feeder to start with; for at this time of the year, unless your hives are situated in a district plentifully supplied with heather, the

majority of the honey-producing flowers are over, and consequently the bees have little chance of getting in enough stores to take them over the winter.

But nevertheless, if looked after properly and attended to with care, a late-season swarm may go into winter quarters very comfortably off, and should develop the next spring into a stock of ordinary strength.

AFTER-SWARMS OR CASTS

The first swarm being hived, especially if it is an early swarm, may be followed, but not often, by smaller swarms, sometimes to the number of three or four. These smaller swarms are known as after-swarms or casts. They are almost without exception led out by virgin queens. Very often, if the old colony have constructed a good many queen cells and they begin to hatch out all at once, an after-swarm will contain more than one queen—sometimes as many as half a dozen,—which fact, when he discovers it, usually greatly perplexes the amateur, to whom it seems a direct contravention of the axioms he has already learnt.

If, on the other hand, the queens hatch out

one after the other, they will sometimes each one go out with a separate cast. These after-swarms can always be easily distinguished, for they are very small and contain only a few bees, often only about a pint.

These after-swarms are, as a rule, of no value whatever to the bee-keeper, especially the amateur. True, one sometimes hears of an extra-patient and painstaking enthusiast who has hived one of them separately, and by dint of careful feeding developed them in time into a fairly healthy, flourishing stock. If you wish to try the experiment yourself, you should hive the bees in the usual way and give them a comb already filled with brood and honey. This will provide them with food and give the queen—when she has become fertilised—some brood cells ready for egg-laying straight away.

Another method of strengthening these after-swarms when hived, and which is often adopted, is as follows. After hiving them, having given them the brood frame before mentioned, wait until midday, when the greater number of workers from the parent hive are away honey-gathering, then take the parent

hive away and put the one containing the newly hived swarm in its place. Care must be taken to move the parent hive a good distance away, right to the other side of the garden if possible, and also turn it round to face a different aspect. Thus when the honey-gatherers come home they go back into the new hive, which should be as like the old one in appearance as possible, and add considerably to the numerical strength of the new colony. But the average amateur will have no use for these casts, and he should simply catch them and return them to the hive from which they came, after extracting the queen or queens as the case may be. They will go back quietly enough and, in the absence of the queens, will settle down to work again with the old colony as if nothing had happened.

Hunger-Swarms.—There is another sort of swarm which occasionally comes under the bee-keeper's eyes, and one which I hope no reader of this book will ever let come out of any of his hives. I mean a hunger-swarm. When bees are very short of food they will sometimes come out in a fruitless, despairing sort of way, presumably in the endeavour to alight upon a more fruitful

spot. But no bee-man who takes the slightest trouble with his bees will allow them to get so short of food as is necessary to make the hunger-swarm.

PREVENTION OF SWARMING

Now, swarming altogether is a thing that many bee-keepers for many years have been doing their utmost to prevent. For indeed to a great many of us the whole thing can be regarded as nothing short of a nuisance. Besides the weakening effect it has on the stocks when they are in full swing at honey-gathering, it is a cause of no little trouble and anxiety to the bee-keeper, who is always on the look-out, watching and waiting for the swarm to come. Also our neighbours, as a rule, are not over-pleased when a swarm takes it into its head to settle on one of the small pear trees just outside the kitchen door. Consequently a great deal of time and energy has been expended in endeavouring to devise some contrivance that will prevent swarming, or automatically catch and hive the issuing swarm. But all their labour has ended in nothing. Swarming is, of course, part of the natural

life of the bee, and all attempts to stop it necessarily fail.

There are, however, several methods to modify its inconvenience which are worth noting.

A good plan to delay and sometimes altogether prevent swarming, is to considerably enlarge the hive by the addition of a few more brood frames towards the climax of the honey flow, which will give the bees much more room to work on and the queen more space for laying, and this plan, if properly carried out, often has the effect of directing the attention of the bees from swarming; but it is by no means an infallible method, for often the bees will swarm in spite of increased room and empty brood frames.

Another method is to cage the queen and take her out of the hive altogether when upon examination several queen cells are found in the brood chamber. If all the queen cells have been cut out and the queen removed, the bees will straight away commence a worker cell in which an egg or a very young worker larva is installed into a queen's cell by enlarging it and feeding the grub as it grows on the royal food.

So it is necessary to examine the hive again a week and then a fortnight after the first caging of the queen, in order to ascertain if any of these queen cells have been constructed, and, if so, to remove them. It is a tiresome and tedious work this, and falls to the lot only, as a rule, of the experienced man, whose knowledge of bee-craft is necessary to successfully carry it out.

Another method is to transfer, just in the same manner as a swarm, a certain number of bees from the old hive, which is moved from its place and another one erected in its stead, but on the same spot of ground and preferably on the old stand. This new hive is provided with frames with foundation, and also, if obtainable, a little unhatched, well-advanced brood, and the bees are introduced into it in really the same manner as a swarm is introduced into its new home. There have also been several hives specially constructed with contrivances for the self-hiving of swarms; but none of them, as far as I have known, have ever worked in at all a satisfactory or reliable manner. But, although it may be almost taken as an accepted fact that the prevention of swarming is a task beyond the

accomplishments of the bee-keeper, so, as a rule (although every young bee-keeper when he takes up the hobby thinks that he will be able to prevent swarming, and reads of all the known appliances for that purpose, and sometimes even goes the length of making a few experiments on his own account), he soon comes to the conclusion that the majority of other bee-men have come to before him—that swarming is natural to the bees, and so after all it is as well to let them swarm if they want to, and not trouble about preventative appliances which, as a rule, do not prevent at all. True, it is very annoying to see a good strong stock that is getting in a lot of honey suddenly weaken itself by sending out a large swarm, but it is one of those aggravating little things that the bee-keeper has to put up with.

HONEY AND HONEYCOMB

The making and planning of the honeycomb is by many people looked upon as one of the most wonderful works in the whole curriculum of natural construction. It is wonderful, but, like all specially curious or noteworthy natural

phenomena, it is very often exaggerated or spoken of incorrectly by people and papers who know only a little of the subject they are talking about.

As everybody with the slightest pretensions to mathematical knowledge is aware, a hexagon is the simplest and strongest form of construction for any number of separate compartments placed touching one another in the same plane, the strongest and the most economical in the space. So all honeycomb, with the exception of the queen cells, is made, roughly speaking, hexagonal in shape. The generally accepted belief that all cells are mathematically correct hexagons is by no means invariable, for very often, especially when building drone comb, the bees will construct polygons of various shapes to suit the accidental shape of the hive or skep in which they are working.

The actual size of ordinary worker comb is about five cells to the inch, and that number will be found on all machine-made foundations. Drone cells, of course, are a little larger, running four cells to the inch ; but the drone comb in the natural-built comb is often more irregular and carelessly built.

In the notes under the heading of "Wax" the constituents and method of production of this unique substance are given, so there is no need to repeat them here.

The amount of labour and time spent by the bee in the manufacture and building up of the comb is very great indeed, and occupies a great deal of valuable time in the middle of the season which might much more profitably, from the bee-keeper's point of view, be devoted to honey-gathering; and so, with the object of lessening this labour as much as possible, we make, as has been mentioned before, a foundation of wax. This is made of a thin sheet of wax, put through rollers embossed with the pattern of the bee-cell, and is then fixed into the frames or sections. It gives the bees a start in the making of their cells, and also, the wax being much thicker than the natural cell layers, they draw it out into the required shape, and are thus saved the work of having to make the wax themselves. Also the machine-made comb foundation is all exactly regular in shape, and as such a decided improvement upon the natural article as far as appearance is concerned.

The cells are made to slope up slightly from

the base, which prevents the liquid honey from running out before it is capped over.

This comb foundation furnishes another great advantage, insomuch as, by using only that of worker size through the whole hive, we can control to a great extent the breeding of too many drones, which are nothing but a nuisance and an encumbrance to the honey-gatherers.

There are several different makes of foundation comb in use in this country, and each recommended by its individual manufacturer; but it is on all hands admitted that the best for general purposes is the "Weed" foundation. This is especially strong and very thin, so that when working for comb honey and sections it is especially advantageous. The ordinary foundation does very well for brood, but in comparison to the "Weed" it is very inferior for other purposes; but it is cheaper although heavier.

Improved Method of Fixing Foundation Wax with Grooves.—In the top bar of the frame two grooves are cut, leaving a thin strip of wood between. Into one of these grooves the foundation is placed, and a wedge-shaped strip of wood

driven or pressed into the other one. This wedges the foundation tightly into the frames.

The advantages of this method of fixing are very apparent; for, besides holding the wax firmly and evenly all along the top bar, the

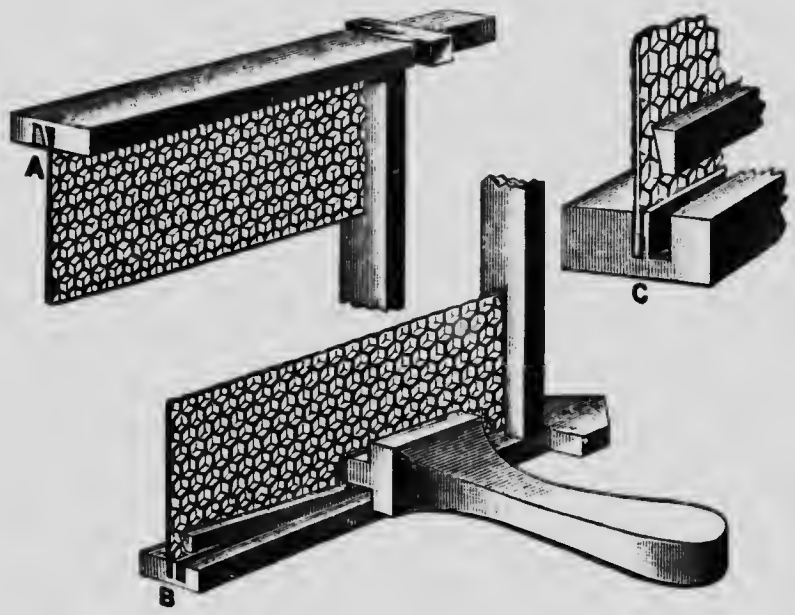

FIG. 16.

upper edge of the foundation is not exposed—as happens in cases where simply split top bars are used—and so is kept perfectly secure from the wax moth. I would advise all bee-keepers to see that they are supplied with this pattern frame.

In the illustration, A shows the foundation

fixed complete; B, method of driving in the wedge; C, foundation in position ready for the wedge.

Of the other kinds, such as flat-bottomed foundation, little need be said; they were sometimes used rather extensively at the time of their introduction, but soon fell into disuse again.

An important point to remember when making up frames and fixing in foundation is to see that the foundation is well "wired." This is done by stretching thin wires across the frames and embedding them into the foundation with a slot-pointed instrument known as an embedder. But any frames you buy already fitted with a foundation will be wired, so the simplest way of learning how to do this is to carefully look how these bought frames are done, and then do any you may make up yourself like them.

The reason wiring frames is so important is because it prevents the honeycomb falling down; for when a comb is full of honey it is very heavy, and the foundation is frequently not strong enough to hold it in its place in the frame, and, in consequence, it breaks down and

makes an awful mess inside the hive. So it is always advisable to even over-wire your frames. I always do. More strength in this case is better than not enough.

Of the different kinds of frames that have from time to time been introduced by optimistic pioneers, the most generally used in these islands are the plain frames fitted with W.B.C.

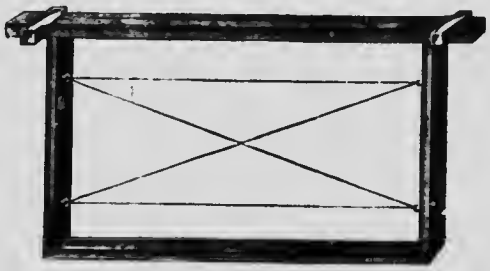

FIG. 17.—Standard Frame. Showing correct method of wiring.

ends. These little tin ends fit over the shoulders of the frames and effect a perfect method of self-spacing. The other self-spacing frames with simple wood shoulders are gradually falling into disuse before the handier W.B.C. end.

Another point worth remembering about frames is to see they are mortised both at the top and bottom corners. Some manufacturers advertise a very cheap frame, which

by its price is likely to tempt the economical beginner; but it is much better policy to buy mortised frames, which last longer and are very much stronger, and will stand a great deal of hard usage.

There are two different sizes of frames used in modern apiculture—the ordinary standard brood frames, and a shallower and slightly broader kind used only in the supers for extracted honey. These frames are made shallower so as to allow them better to be extracted. As these shallow frames are never used for brood purposes, it is often a practice to fit them with drone-size foundation, the idea being, of course, that the larger-sized cells will yield a greater quantity of honey in comparison to the wax, besides giving the appearance of bigger and finer combs; but I do not think that results justify one in saying that there is any marked difference in the properties of honey obtained by the use of the larger comb. In the sections for table use the comb only lasts one season, but with the brood comb this is different. The wax itself in the comb would last for ever practically, and it is only the bees them-

selves that make it necessary to change the brood combs occasionally. For as each fresh bee emerges from a cell it leaves its silken chrysalis cover, which in size just fitted the inside of the cell, behind it, and the new egg is laid inside this old shell; and, as a natural consequence, as time goes on the cells get gradually clogged up with these shells until they are too small for rearing bees in at all. Of course, in their natural state, if living in a hollow tree—a much more roomy and commodious place—such as is invariably chosen by wild bees, they would simply build new combs and desert those that have become fouled and useless. But obviously in a modern hive this course of things is impossible, and so a look-out must be kept to see that the combs are all kept fairly new. Three or four years is the usual time to have the same comb in one hive. It often happens that at the end of a season or two the amateur finds himself possessed of a fair number of old combs for which he has no use, and is sometimes rather perplexed as to what to do with them. To melt down or render, as it is called, is a simple process, when one has enough combs to melt

and the proper appliances to do it with, which, of course, the amateur has not. No, the best way of getting rid of these old combs is undoubtedly to melt them down in the old-fashioned, though wasteful, way of putting the combs smashed up into a canvas cloth or bag, and then immersing the whole lot in a large pot or fish-kettle of boiling water; then, by prodding the bag with a stick, the wax will percolate through the canvas and float on the top of the water, where it can be collected and easily moulded into small cakes. It is often worth while to render what wax one can from old combs, etc.—especially if one is naturally of an economical turn of mind,—for all the dealers will take it in exchange for a new foundation, especially if it is clean and of a nice light colour.

Now, as to the method of extracting and bottling honey. This is always a tiresome job unless you have a good deal of it to do, and it is for this reason that a great many amateurs run their supers simply for sections. Because sections are neat and clean things to handle, they will keep practically indefinitely and are never extracted. If you only have

one or two hives, I should advise you to let shallow frames alone and stick to sections; you will find it much less trouble, and they are just as nice for table.

But nevertheless there are some people who no doubt wish to try their hand at extracting. Well, of course, by far and away the best method is to use an extractor—the bigger the better; in fact, very little run honey is now taken but by this method. But one of these machines is expensive to buy, and takes up a tremendous amount of room in a small outhouse. True, there are many small machines on the market, but most of them are unsatisfactory, and they involve an enormous amount of physical exercise for the production of a very little honey. So the simplest plan is to find out some bee-keeper in your vicinity who possesses a fairly big machine, and then take your combs over and get him to extract them for you.

It is possible to get the honey by smashing up the combs and straining them through a piece of gauze, but this is a frightfully messy job, and is usually never done more than once.

The honey thus extracted may be of many

different shades of colour, in accordance with the flower from which it has been gathered.

The finest honey is generally considered that which comes from the clover or the lime, and which is the commonest kind obtained in the Midlands and southern parts of the country. It is of a very light yellow colour, and should be, when bottled, perfectly clear. Honey extracted from old combs, or squashed out of the combs through a piece of gauze, or other rural and antiquated methods, always contains a certain amount of impurities, which give it a darker, more distasteful appearance. So the lighter and clearer you can get your honey—if it is clover or lime—the better.

There is, however, one other kind of honey—very highly prized, and in fact with a world-wide reputation—which is of a much darker colour. I mean heather-honey. This naturally comes from the heather, and is only obtained from those parts of the country where moorland and the rough wastes on which the heather grows are to be found; and as the heather blooms late in the year, and flowers often quite into the autumn, this naturally forms a very late crop. In some districts where the bee-keeper is fortu-

nate enough to possess both clover or hay fields, and heather moors only a short distance off, it is a practice well worth while to move the bees on to the moors about the end of July or the beginning of August, and thus get practically two honey-flows in the same season; but this happy state of affairs is not very common, and the majority of bee-men have to be content with one of them only.

In colour the heather-honey is dark—not a dirty, muddy colour, like honey-dew, for instance, but a rich golden colour, something like dark golden syrup; and its taste, to which, of course, it owes its reputation, is fuller and more pungent than the lighter and more common kinds of honey.

A few words as to bottling the extracted honey may be in season here. Glass jars with cork wads and screw caps are almost universally used for this purpose, and can be obtained from all the dealers, with suitable labels, in 1-lb. and ½-lb. sizes. And if you contemplate buying honey jars, let me advise you to buy good-quality ones. There are a great many jars now on the market, very attractive in price, but of an abominable quality. These

cheap jars are usually rough and raw round the top of the neck, and the screw caps chiefly stamped and untrimmed, so that you cut yourself in no time when trying to open or screw them up. Besides this, the quality of the glass is bad and spoils the appearance of the honey inside. These cheap jars are no doubt a necessity to the man who has to bottle up an enormous quantity of honey and sell it at a very cut price in order to get a living at all; but the amateur who wants his honey for his private use and to give to his friends will find the good class bottles made of clear glass and with caps and wads of the best quality an infinitely better investment.

WAX

It is not necessary in a book of this description to give a very detailed or exhaustive account of the history or various uses of wax, and so I propose here to simply consider it as it applies to the one or two hives of the amateur bee-keeper. Bees'-wax is a unique thing among the many products of nature. Nothing like it, nothing that possesses the same properties of

ductility, or ability to stand changes of temperature, or is so permanent and seemingly free from decay or decomposition, exists either naturally or artificially.

There are many substitutes for bees'-wax, principally paraffin wax and creosin, as well as sundry other vegetable and mineral waxes, and a few, though rare, waxes produced by other insects.

Of these substitutes paraffin wax is by far the commonest in this country, and is very often used to adulterate the fine though more expensive article. But for the bee-keeper's uses nothing but the purer wax is of any use, as the bees refuse to work any other kind.

A foundation has been made of all the different substitutes, and experiments made with them from time to time. But all these experiments, without exception, have met with failure, the wax they were composed of being either too brittle to be worked by the bees or too soft to stand the central heat of the hive. The amateur is, however, not likely to be troubled with any of this inferior or adulterated foundation if he buys from any of the well-known and reputable appliance makers or dealers, who all

use nothing but the purest wax in the preparation of their wares.

There are several ways of chemically testing the purity of wax. These are of no interest to the amateur, who will in all probability never be offered any but the best and pure article. Imitations can generally be detected by their smell—especially paraffin wax—and also by their brittleness.

Wax varies a good bit in colour, and gets darker as it gets older. Thus you may find that the wax your dealer sends you for brood is of a considerably darker shade than that used for supers or sections. This is caused by the fact that it is probably made from old combs; hence it is a little cheaper, but none the less just as serviceable.

The finest English wax is of a very light yellow colour, and some of the finest Weed super foundation is almost white.

The causes of the darker appearance of old wax, and a short account of how to melt it down or "rend" it, have already been given in the notes on honeycomb, and so we will not reopen it here.

How the bees made wax, and whence

they obtained it, was for many ages a subject of uncertainty and conjecture. For the old hives, being all built in one piece, could not be taken apart, and all that went on within their four walls was, naturally shrouded in a certain amount of mystery.

But the age of the observatory and box-framed hives has altered all this; we can now take every part of the hive to pieces, and nothing is left that we cannot understand and see for ourselves; and one of the most wonderful things that the box-framed hive has made clear to us is how the bees make their wax.

Wax is produced by the bee itself, and it exudes in the form of thin plates or sheets from the abdominal scales of the workers. (The drones take no part in the wax-making, neither does the queen.)

The bees first fill themselves with honey, and then band together in a cluster in the centre of the hive. In this position they naturally generate a certain amount of heat, under the influence of which the wax, which is formed in the intestines of the bee, slowly oozes out through joints of the scaly plates that cover

the abdomen. The bee scrapes these thin, transparent plates from her sides with her strong hind legs, and kneads them up into a little ball of the right consistency. This little ball is then carried to the cells, and with the help of the bee's strong jaws is worked into shape; and so bit by bit the new comb appears, always bright and clear and beautiful, perfectly accurate and unerringly symmetrical.

It is a very weary and tedious operation for the bees to undergo, and, as will be realised, takes up a lot of time just at the important part of the season, when as many bees as possible are wanted for honey-gathering; and it is with the object of lessening their wax-making labours that we give the bees foundation, for in the natural course of events the whole of the comb has to be made by the bees themselves, while, when they are given the foundation, they work it out into the combs and thus are saved much labour and time.

Some bee-keepers, with peculiar notions of economy, prefer only to give their bees a narrow strip of foundation along the top of the frame—just sufficient, in fact, to guide them

when comb-building. These narrow strips are called starters, but the use of them (except perhaps in the section rack) shows, I think, a very penny-wise and pound-foolish disposition. For while the bees are working all the rest of that comb they might be honey-getting, which, especially in a good season, would be infinitely more profitable.

WAX MOTH

The wax moth is a little insect who, by the part it plays in apiculture, deserves a short paragraph to itself.

Like the majority of other moths and butterflies—excepting, of course, those particular ones that attack one's clothes—the most destructive portion of the life of the wax moth is the caterpillar. The caterpillar feeds on the wax of the combs, and his presence in a hive is by no means an uncommon sight.

It does no very great harm, but simply from the fact that he eats the precious wax it naturally becomes an enemy of the apiarist. Besides this, the continuance of its presence is a sign that the hive is not well looked after. The female moth, having found her

way into the hive, lays her eggs among the wax, usually on the top of the comb. One objection to the split top bar frames is that they expose the top of the foundation to the wax moth, and so the wedge-fitting frames are finding more and more favour with bee-keepers on that account.

The presence of the caterpillar can be easily distinguished ; the somewhat fluffy channel that it cuts for itself as it eats its way along the comb cannot fail to attract the attention of even the most careless and hurried examiner.

If, as soon as it is discovered, the caterpillar be picked out and killed, and a little naphthalene, such as will be found listed in every bee appliance catalogue, be put into the hive, its appearance will not again cause any trouble.

When examining old hives that have not been opened or examined for some seasons, a special look-out should be kept for the wax moth ; and if you are examining the hives with a view to purchasing them, a lower price can often be demanded on that account.

POLLEN

If you have at any time sat down and watched the bees at work, coming and going around the entrance of the hive when the honey harvest is in full swing and comb-building naturally is going on rapidly inside, you will no doubt have noticed a certain number of bees coming home dusty, and covered with a fine yellow powder, and with great lumps of it sticking to their rear legs—lumps or cakes often so large and unwieldy that the bees seem to have some difficulty in flying and in walking up the alighting board to the hive entrance.

The yellow powder is pollen, an absolute necessity to bee existence, and it is therefore, of course, also necessary that everyone who aspires to the name of a bee-keeper should know something about it.

If we walk round the garden and look at the hollyhock, or the various types of lilies, and other such flowers, we shall find the bees burrowing right down into the heart of the flower and getting smothered all over with the pollen grains. The bee, when in this state,

at once commences to clean herself down, and scrapes as much of the pollen as she can reach off her body with her front legs, which are covered with hair like brushes.

From the front legs the gathered pollen is passed to the middle ones, and from there to the hindmost, where it is stored in a little natural cavity in the leg, known as the pollen basket. But the bee is unable to clean herself of all the pollen grains with which she is covered, and in consequence arrives at the hive in the dusty state already mentioned. No sooner has she entered the portals of her home, however, than the other workers at once set to work and clean off any grain that lies entangled in the hairs that cover her body.

The reason that pollen is such a necessity to the bee is, of course, the fact that no brood can be reared without it, as it, mixed with honey, forms the food of the larvæ as well as of all the other inmates of the hive.

Without pollen no brood can be raised in the hive, as all the larvæ would soon die. S it behoves the careful apiarist to keep a sharp look-out and see that his bees are bringing in a good supply of the necessary food.

At the beginning of the season, as a means of stimulating the brood-rearing, artificial methods are sometimes resorted to for supplying this essential pollen. Pea flour is about the best of these, and a very good plan, if you wish to try and administer it, is to place some shavings or small wood chips in a fairly flat dish, a pie-dish for preference, and sprinkle these with the pea flour, and stand the dish a convenient distance from the hive. The bees will soon find out its existence, and will readily avail themselves of the flour, which seems to be quite nutritious enough for their feeding purposes, especially if the supply of the natural article is somewhat short. This often induces brood-rearing to commence much earlier than usual, with the consequent advantage of greater numerical strength when the honey season comes along.

PROPOLIS

The amateur will not long be acquainted with his bees before he is familiar with propolis, and how everything within the hives seems covered with it, and how sticky it is, and how difficult to remove, when the bees have smeared and

covered everything with it. Propolis is a kind of resinous gum, used by the bees to cover up odd chinks and crannies that may exist within their hive; for, as Nature abhors a vacuum, so the bees abhor anything in the nature of a crevice or crack that may let in the air, and so destroy to a certain extent the warmth of the hive, or harbour any insect or foreign matter. So soon as they find the slightest suspicion of anything of that nature, then they straightway fill it up with propolis. It is for this reason particularly that bee-hives are always made to fit together so exactly, for a badly built hive will, when one comes to open it, be found to be stuck together, and all manner of places, with all loose or ill-fitting parts, firmly fixed with this hard, slightly yellow, gum-like cement.

Where the bees get their propolis has never been definitely settled. It was, and still is, supposed by some people to be extracted by them from the various buds of the horse-chestnut and other similar trees, and from the thick gummy substances that ooze from the bark of the cherry and other of the garden trees. But no one, as far as I am aware, has ever seen the

bees gathering it, except from old combs or sections, which they do very freely when one is careless enough to leave such things lying about in places where the bees can get at them.

Besides filling up odd chinks and crevices in the hive, the bees smother with propolis everything, such as the tops of the frames or sections that may be left exposed, and also even the combs in the lower chamber with it as well, no doubt for the purpose of strength.

Propolis, besides being very unpleasantly sticky, as the amateur will soon find out when he gets some of it on his fingers, is also a very difficult thing to remove from anything the bees may have covered with it. If you should at any time wish to clean up any frames or old hives, by far the quickest way is to dip them into a can of boiling water to which a little soft soap has been added, which will soon dissolve it all; otherwise you will experience no small difficulty in removing it.

The sort of mania that seems to exist among bees for covering every conceivable thing in their hive with propolis, especially towards the

end of the honey season, when the majority of flowers are over and the bees do not seem to have very much to do, often induces them to cover over the sealed-up sections, and this gives them a darker and less fresh appearance than they have when taken fresh and clean from the hive. To prevent this, a pretty strict watch should be kept on the supers, and the sections removed as soon as full. Of course it is practically impossible to keep propolis from the sections altogether. The W.B.C. section rack helps us a little, it is true, but the bees always smear the woodwork as soon as they start to work in the section rack; but by taking them off as soon as filled we get them much cleaner, for the longer they are left on after they are full the dirtier they get.

WINTERING

After the heather-honey has been gathered and you have taken the last sections off, towards the end of August or the beginning of September, or even earlier, according to the bee crops of your district, the end of the season has arrived. The few flowers that may bloom

in your garden at the end of the summer are of no value to the bees as far as honey-gathering is concerned, although you see them flying round about them on fine days.

So when you take off the last sections the bees must be packed up for winter.

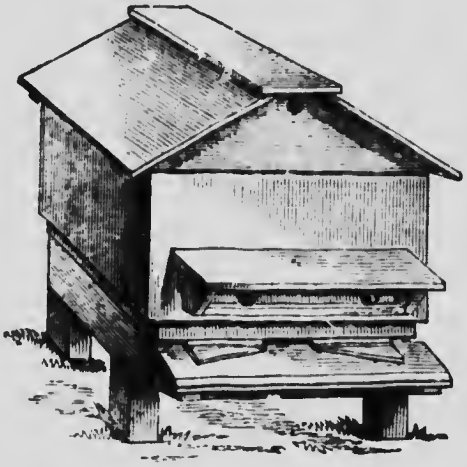

FIG. 18.—Hive reduced and packed for wintering.

Now, what we have chiefly to guard against in this English winter of ours is not so much cold as damp. Of course, cold has to be guarded against, but plenty of top coverings and quilts will do all that is necessary in that direction; but damp, on the other hand, has to be more carefully looked after, and it is here that the cheap hive the too economical amateur

may have invested in in the spring will begin to show what it is made of.

The hive should be carefully inspected to see that no cracks through which the damp might come are to be found in the roof and sides, and the floor-boards just examined in the same way; for although perhaps not so much damp as insects will be likely to find their way in there, the insects are just as unwelcome visitors.

Having carefully inspected the whole hive and made sure everything is watertight and strong, the lifts, if the hive is of the telescope variety, should be inverted over the body, and the whole brought into as small a compass as possible.

Old section racks and other appliances should not be left in the roof of the hive all the winter, for you will not want to use them, and they will take up a lot of room and make the hive high, and consequently more likely to blow over during a storm.

When the hive was set up in the spring, it ought to have been set upon four bricks or stones of a like nature, which would keep the legs off the ground; if you have omitted to do this, just see that it is done now, for if the legs

are left standing simply on the damp mould there is always a danger that they will rot, and to the hive that stands upon rotten legs many disastrous things may happen.

If, as you should have done, you have left plenty of food in the brood chamber, there will be no occasion to worry about feeding during the winter months, and only towards spring, when active signs of life begin to appear, should the feeder be applied.

Having closed up the hive and made everything tight and compact, nothing more need be done. Some enthusiasts, however, seem possessed of the idea that the bees welcome an occasional visit or two during their winter hibernation ; so they just take off the coverings and look in just to see that everything is satisfactory. This is absolutely unnecessary and, besides, in many cases harmful to the bees, for it expels much of the internal warmth of the hive, and consequently exposes them to the risk of chill.

When, however, the winter is nearly over, towards the end of February or the beginning of March, you should be on the alert again, for, as has already been explained under the heading

of Feeding, a very great deal depends on a good start.

Provided they have enough food—and it may be taken as a safe rule that, if all the honey is left in the brood chamber at the end of the season, they will have an ample supply—and that they are well packed up and in a secure and, if possible, sheltered position, no apprehension need be felt as to the bees wintering successfully.

DISEASES OF BEES

When one speaks of bee disease the term is, as a rule, understood to mean foul brood.

There are several other minor ailments from which bees suffer, but none of them are anything like so serious, or so hard to get rid of, when the hive has once become infected. So the possibility of its occurrence is a constant source of apprehension to the nervous bee-keeper. Many writers on bees have devoted much space to explaining all its different forms, causes, and effects; I, however, always think that too much is often said on this subject, and the disease made to appear a much more serious menace to bee-keeping than it really is.

Also the mere mention of disease always has the effect of making some people nervous: if they think there is any likelihood of the bees dying, they prefer not to keep them. So I wish most sincerely to impress upon you that, although many books and a vast number of articles in the bee papers have been devoted to the explanation and the expounding of the supposed merits of various cures for foul brood in particular, and the other diseases from which bees, as all other forms of animal life, occasionally suffer, these cases of disease are, when healthy conditions obtain and the modern hives and appliances are used, of comparatively rare occurrence, and the fear of them need cause the amateur no uneasiness.

Besides all this, the apprehension of disease often leads the amateur who does not know over much about apiculture to fancy it exists when the stock is as healthy as can be; the constant fear of foul brood makes him think that his bees have fallen a victim to the disease whenever he finds a few dead grubs in any of the brood cells.

At one time I seriously considered leaving out diseases altogether; but it seems that

perhaps the book would not be complete enough without some short account and description of them, and so I have included it, but have only considered the disease sufficiently to enable the amateur to diagnose it if necessary.

Bee disease may be divided into two classes —that which attacks the mature, grown bee, and that which attacks the grub in the brood cell.

It will at once be seen that the brood disease is the most important, because on a healthy brood the future of the hive depends.

The diseases that affect the full-grown bees are almost always brought about by bad and unhealthy conditions of living. Bad hives that let in the wet, insufficient feeding, cold and damp exposures are the principal causes, and are responsible for what is known as bee paralysis, dysentery, and spring dwindling. The presence of any of these in the hive is easily noticeable by the general air of apathy and laziness that takes possession of the affected colony. The simplest cure is to look after them well, give them plenty of food, and see the hive is warm and dry, when the bees

will, as a rule, speedily recover of their own accord.

The affection of the brood by what is known as "foul brood" is, however, a much more serious matter.

Exactly how the contagion arises has not been satisfactorily explained. Certain it is that, if one hive in the district is affected, it will often spread to every neighbouring apiary.

The disease principally attacks the grubs, and seems to have little effect upon the adult bees. The grubs die in the cells, then shrivel up, and emit a most objectionable odour. The presence of the disease in the sealed brood can be distinguished by the sunken appearance of the capping, which in advanced cases will be found to be perforated with small holes at the top. If this capping is broken open with a pin and the grub extracted, it will be found dead, shrivelled and discoloured.

The seriousness of this state of things will at once be appreciated, for, all the brood dying in the cells, no fresh bees hatch out to carry on the work of the hive, and so as a natural consequence the stock gradually dwindles until it finally becomes altogether extinct.

If the disease is taken in its earlier stages, it may be checked and often eradicated by the drastic means of thoroughly cleaning out the hive and burning or destroying all the affected combs, and transferring the bees to a new hive.

If, as a beginner, you should be unfortunate enough (which is unlikely) to find your bees thus diseased, I would advise you to call in an expert and let him manage this abolishing business for you.

The presence of a few dead grubs in the brood cells must not, however, be taken as a sign that the hive is infected, for, considering the vast amount of grubs that are annually reared within the four walls of the hive, it is only natural that one or two should not reach the state of a perfect bee.

STINGS

Although the ordinary bee-keeper scorns the mere mention of stings, I think that they loom very large in the imagination of many good people who would like to take up bees, but are rather apprehensive about their stinging powers.

Many nervous and indulgent fathers, while readily admitting the excellence of home-gathered honey as a food for their children, nevertheless entertain great fears that their little darlings might occasionally get stung, and so decide to be on the safe side and have nothing whatever to do with a hive. So it is with the object of dispelling as much as possible of this very much exaggerated apprehension that I add this short chapter on the defensive weapon of the bee.

Of course, bees do sting, and the sting is painful if you are not used to it, and often swells very much, and as such is a certain disfigurement while it lasts. But by careful use of the veil and judicious handling of his bees the bee-keeper need scarcely ever get stung; it is the clumsy amateur, who does not trouble to use his veil and who handles them in a rough and hasty manner, whom the bees regard as the object of their anger.

As has been mentioned formerly, the best position for a hive is with its back to the path, for, besides being more get-at-able for the purpose of collecting honey, the bees, when leaving the entrance, fly away from the path;

and so, unless one is blessed with particularly meddlesome and mischievous children, there need be no fear of their getting stung while walking round the garden, if they are forcibly impressed with the fact that they must not touch the bee-hive or in any way interfere with the bees. For a bee to maliciously fly at anyone and sting them is an almost unknown occurrence.

Any fruit bushes, such as raspberry canes or blackberry bushes, should not be grown near the hives if it can be avoided. A very good thing to grow round your hives are potatoes. These are planted in the spring when the hive has scarcely started work, and dug again when the work is all over.

But, as far as stings are concerned, it is the person who operates the hive who gets the most, and no matter how careful you are you are bound to get stung.

Some breeds of bees are naturally of a more ferocious disposition than others, notably hybrids, while English and the finer breeds of bees do not sting anything like so freely; and so if a few shillings is not important when you are buying your bees, and you are at all afraid

of stings, I would strongly advise you to invest in English black bees, which you will find of a much calmer and quieter nature.

There are two parts of the body on which you will receive ninety per cent. of your stings—the hands and face. The hands do not matter much, for I have found stings there seldom swell much, and the pain soon goes away; but with the face things are different.

A good sting under the eye (a very favourite spot with the bees, by the way) will, if you are not used to such things, swell considerably, often to the extent of closing the eye altogether for a day or two, which, if you are a city man and have to go to town every day to your work, will no doubt provide plenty of amusement for your fellow-passengers, and, to say the least of it, be very unpleasant for you.

So to protect your face you must have your veil adjusted properly, and for this purpose a hat with a good broad brim is essential. The veil must never touch the face, for if it does the bees will straightway sting through it. The other end should be carefully tucked under your coat—I always take my coat off before I put on the veil, so as to make sure that it is

well tucked under, and button it up to the top button afterwards—for wounded bees have a nasty habit of crawling about, and if one of them gets up into the inside of the veil she will give you some unpleasant moments before you dislodge her.

There are some people who advocate the use of gloves or gauntlets, but I think you will find your bare hands serve you better, for gauntlets make your fingers clumsy, and you thus make the bees angry and cause more stings than you need; besides which, I have never yet seen a glove which a ferocious bee could not sting through if she had a mind to.

I also find it pays to wear your bicycle clips when handling bees, for in the dirt underneath the hive there are often bees crawling about, who have dropped down there and been unable to rise, and if they crawl up your legs they are an thing but welcome; also a piece of string round the cuffs of your coat is often useful to prevent them crawling up the arms.

If you observe all these little details you will practically never get stung, and the fear of stings need not worry you at all.

A tip worth noticing, however, is that, if you

should be attacked by the bees, and if they annoy you by buzzing round your head, they will seldom follow if you walk into the shade. Bees naturally love the sun, and so if you quietly walk under a tree or into the outhouse you will find, as a rule, that they will not trouble to follow.

With ladies the solution to the stinging problem is perhaps a little more awkward, because of their hair and the nature of their clothes. But a good-sized straw hat that will hold the veil well away from the face, although it does not look elegant, is distinctly useful, and a man's coat worn over the blouse and buttoned up will be found distinctly serviceable if not very becoming.

There have been, ever since I can remember, plenty of remedies for bee stings, but I have never known any of them do really any good. The proverbial blue-bag or the application of a little cooling lotion is what I have always used, and I think you will find it is as good as anything.

When you are stung, always remember to scrape the sting out as quickly as possible, for there is always a certain amount of

muscular action left in it, which left will work it deeper and deeper down into the skin, and consequently make it more painful and more likely to swell.

I have devoted rather a lot of space to this question of stings, but, as they form such a large part of the anticipating amateur's apprehensions, I think it as well to dispel those, if possible, even if it takes a little space.

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