

DEPARTMENT OF AGRICULTURE
AND TECHNICAL INSTRUCTION FOR IRELAND.

NEW AND REVISED EDITION.

INSTRUCTION
IN
BEE-KEEPING,
FOR THE USE OF
IRISH BEE-KEEPERS.



LONDON:
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE,

To be purchased, either directly or through any Bookseller, from
E. PONSONBY, LTD., 116 GRAFTON STREET, DUBLIN;
WYMAN & SONS, LTD., FETTER LANE, E.C.; or
OLIVER & BOYD, TWEEDDALE COURT, EDINBURGH.

PRINTED BY
BROWNE AND NOLAN, LTD., 24 & 25 NASSAU STREET, DUBLIN.

1912.

Price Nine Pence.

CONTENTS.

	Page
I. Introduction,	5
II. The honey-bee and its methods of working,	6
III. Hives, appliances, accessories, and their uses,	11
IV. Subduing, controlling, and handling bees,	23
V. Arrangement of Apiary,	26
VI. Wiring frames, and fixing foundation in frames,	27
VII. Hiving,	29
VIII. Driving,	32
IX. Transferring bees from a fixed-comb hive to a bar-frame hive,	33
X. Brood-spreading,	35
XI. Natural Swarming,	37
XII. Feeding,	41
XIII. Production of surplus honey for sale or consumption,	44
XIV. Working hives for extracting,	50
XV. Extracting,	54
XVI. Wintering,	56
XVII. Uniting,	58
XVIII. Wax Extracting,	61
XIX. Robbing,	62
XX. Rearing, changing, introducing, forwarding and wintering queens,	63
XXI. Storing and marketing honey,	68
XXII. Chilled brood and foul brood,	71
XXIII. Artificial swarming,	73
XXIV. Recipes,	75
XXV. Moving Hives,	77
XXVI. Spring cleaning,	80
Index,	82

LIST OF ILLUSTRATIONS.

	Page
Fig. 1.* "C.D.B." Bar-frame Hive and Appliances used therewith,	4
Fig. 2. Queen, Worker, and Drone bees,	8
Fig. 3. Honeycomb,	8
Fig. 4. Floor-board,	9
Fig. 5.* Division-board or Dummy,	14
Fig. 6.* Section Crates and section,	14
Fig. 7. Doubling-box,	15
Fig. 8.* Swiss Entrance,	15
Fig. 9. Comb Foundation,	16
Fig. 10.* Wiring appliances,	16
Fig. 11.* Feeders and smoker,	17
Fig. 12.* Cone Bee-escape,	17
Fig. 13. Operator wearing Veil and Sleevelets,	18
Fig. 14. Appliance-box,	19
Fig. 15.* Extracting Appliances,	20
Fig. 16. Hiving-board,	21
Fig. 17. Queen Cage, Queen Travelling-box,	21
Fig. 18. Abbott Swarm-box,	22
Fig. 19.* Nucleus Hive,	23
Fig. 20.* Handling a frame,	24
Fig. 21. Subduing-cloth in use,	26
Fig. 22. Cottage Apiary in Donegal,	26
Fig. 23.* Marking a Frame for Wiring,	27
Fig. 24. Wired Frame,	27
Fig. 25. Method of fastening Wire,	28
Fig. 26. Placing Foundation in Frame,	28
Fig. 27. Wedging Foundation in Frame,	29
Fig. 28.* Driving-irons,	29
Fig. 29. Hiving Swarm through Hive Entrance,	30
Fig. 30. Driving Bees from a Skep,	31
Fig. 31.)	
Fig. 32.) Body-box arranged for transferring,	34
Fig. 33.)	
Fig. 34. Body-box with Quilt arranged for feeding,	35
Fig. 35. Placing Foundation in Sections,	44
Fig. 36. Economic Section-crate filled with "D" sections,	45
Fig. 37.* Tiering,	46
Fig. 38. Section of Hive, showing crates of Sections in position,	48
Fig. 39. Superclearer in position,	49
Fig. 40. Spacing-rack,	49
Fig. 41. Holding queen,	68
Fig. 42.)	
Fig. 43.) Wrapping a section,	69
Fig. 44.)	
Fig. 45.)	
Fig. 46.) Glazing a Section,	69
Fig. 47.* Lath Crate and Sections wrapped prior to packing,	70
Fig. 48.* Pressing bales of sections into crate,	70
Fig. 49.* Sections packed for forwarding by Post,	71
Fig. 50. Extracted Honey Tin,	71
Fig. 51.)	
Fig. 52.) Comb affected by Foul Brood,	72
Fig. 53.* Hive secured for forwarding by rail,	73

* The photographs for the illustrations marked above with an asterisk (*) were supplied by Messrs. Keogh Bros., Photographers, of 75 Lower Dorset Street, Dublin.

INSTRUCTION IN BEE-KEEPING.

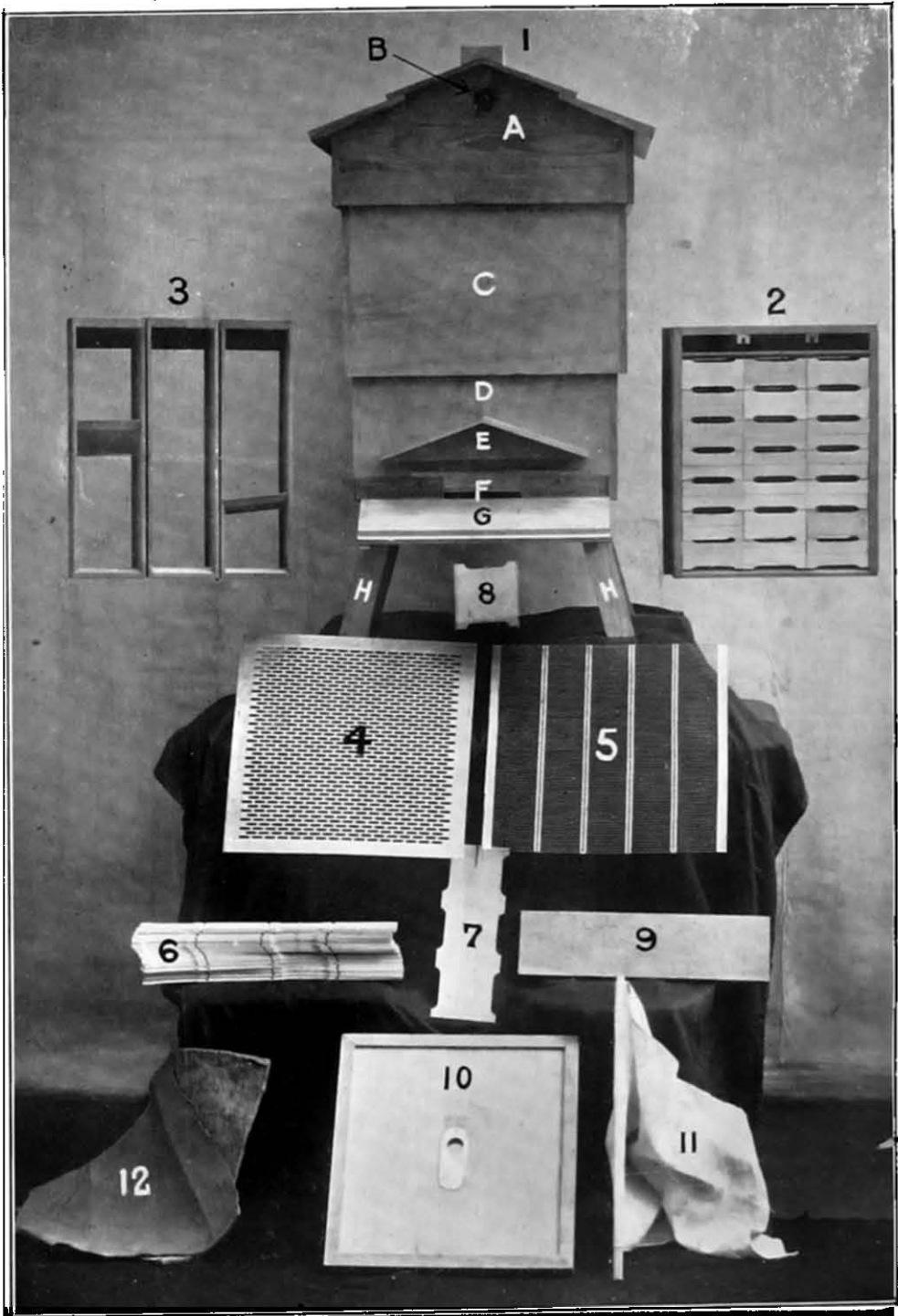


FIG. 1.—“C. D. B.” PATTERN BAR-FRAME HIVE.

FIG. 1.—1. "C. D. B." PATTERN BAR-FRAME HIVE.

- | | |
|-----------------|---|
| A, Roof. | E, Porch. |
| B, Cone escape. | F, Edmondson's improved Swiss entrance. |
| C, Lift. | G, Alighting-board. |
| D, Body-box. | H, Legs of floor-board. |
2. Economic crate with sections, separators, follower and springs in correct position.
3. Divisional crate; followers have been left in the two outer divisions.
- | | |
|---------------------------------|---|
| 4. Zinc queen excluder. | 9. Extension board. |
| 5. Wilkes' wire queen excluder. | 10. Superclearer fitted with Porter bee-escape. |
| 6. "D" sections in the flat. | 11. Subduing cloth, fitted with stick. |
| 7. Long separator. | 12. Quilts, of canvas and of felt. |
8. Short separator.

DEPARTMENT OF AGRICULTURE
AND TECHNICAL INSTRUCTION FOR IRELAND.

INSTRUCTION IN BEE-KEEPING.

I. INTRODUCTION.

The instructions which follow are intended for users of bar-frame hives of the "C. D. B." or similar types (18).

The figures within brackets refer throughout to the sections or paragraphs to which it is desired to direct the reader's attention.

Everyone who wishes to keep bees should learn something of their nature, habits, and requirements.

1. Works on Bee-keeping. The instructions here given are only intended to supply sufficient information to enable a novice to keep bees with profit; those who desire to study the subject more fully should refer to the following works:—

"The Practical Bee Guide," by Rev. J. G. Digges; published at *The Irish Bee Journal* Office, Lough Rynn, Co. Leitrim; and by Eason and Son, Ltd., Dublin; price, 2s. in paper cover; 3s. cloth.

"The Honey Bee: its Natural History, Anatomy, and Physiology," by T. W. Cowan, F.L.S.; published by Madgwick, Houlston & Co., Ltd., 4 Ave Maria Lane, London, E.C.; price 2s. 6d.

"The British Bee-Keeper's Guide Book," by T. W. Cowan; published by Houlston & Sons; price 1s. 6d.

To all the above works frequent reference has been made for much of the information contained herein.

Those who desire to practise queen-rearing, are recommended to read "Queen-Rearing in England," by F. W. L. Sladen; published by Madgwick, Houlston & Co., Ltd., 4 Ave Maria Lane, London, E.C.; price 1s. 0d.

It is essential to success in bee-keeping, that the bee-keeper or some competent person should be on the spot to give proper attention to the apiary supervision essential during the months from March to September inclusive; with a small number of hives it is not necessary to devote much time to their management; but to work them to the greatest advantage, it is essential that the right thing should be done at the right moment; hence, bee-keeping is especially suited to cottagers and small

occupiers, who are not likely to be absent from their homes for several days at a time : it is also an industry for which women are well adapted ; many of the most successful and capable bee-keepers being women.

The profits from bee-keeping are large compared with the necessary cash outlay. As a rule, one bar-frame

3. Profits. hive of bees properly looked after in a good honey district, will, after providing for its own wants, produce on an average about 60 lbs. weight of section honey in a season, worth, at 5d. per lb., £1 5s., so that, allowing 10s. for necessary expenses, the actual profit may be put at 15s., while the first cost of the hive, outfit, and stock of bees is about £2.

II. THE HONEY BEE AND ITS METHODS OF WORKING.

In most localities the principal flower supply of honey prevails during the months of June, July and

4. Honey Supply. August, as also in May in early districts, and September in late districts ; and generally a strong stock in a bar-frame hive will not only support itself throughout most of this period, and provide a surplus for removal as above estimated, but will also lay by a sufficient store of honey to support it through the winter (125). The principal sources of honey supply in Ireland are—in the spring, the blossoms of fruit trees and of some forest trees and shrubs, those of willow, gorse or whin, blackthorn, gooseberry, and plum being amongst the earliest ; in summer, white clover and lime, and in autumn, blackberry, ling heather, wild scabious or devil's bit, ivy, &c. Districts in which white clover flourishes are particularly well adapted for bee-keeping.

Misconceptions often occur amongst beginners, owing to the misuse of terms : the following definitions apply to terms which frequently occur in the instructions which follow : bee-keepers should accustom themselves to apply these terms correctly.

5. Definitions. A "swarm" signifies the bees which migrate in a body from an existing stock.

A "cast" is a term by which the second or any subsequent swarm which leaves a stock in one season is designated.

A "hive" signifies the artificial structure in which a stock is maintained.

A "stock" of bees signifies the living bee population of a hive, with its brood.

The Black or native bees are on the whole the best comb honey producers : beginners are recommended to select this variety. The Italian or Ligurian

5a. Races of Bees. bees are the best gatherers of honey, but their capping of cells is defective, and consequently reduces the market value of section honey produced

by them. The Carniolan bees are very mild tempered, much more prolific than either Black or Italian bees, but very much given to swarming and thereby exhausting their energies; they are therefore undesirable when the production of honey is the principal consideration.

The Queen Bee (Fig 2) has a longer body than the workers, and her wings are short in proportion to her length; she is provided with a sting, which is used as a weapon of offence against rival

queens. The queen can be easily distinguished if looked for before drones are hatched out, when the hive population is at its lowest. Beginners, who are not familiar with the appearance of the queen, should try to find her when they have occasion to open the hive on warm days in April or May for spring cleaning (186), or to ascertain the amount of food present, or for brood spreading (88). Great care should be taken when examining frames at this period (IV.), to avoid exposing brood to chills. The virgin queen usually leaves the hive to be mated by the drone (8) in from three to five days after her birth; this mating suffices for her life, and on her return to the hive she will remain in it for good, unless she leaves with a first swarm. An unmated queen will lay eggs that will produce drones only; a queen must be mated in order that she may lay eggs which will produce females, that is to say, workers; the mated queen has the faculty of determining before she deposits eggs whether they shall produce males or females. In a bar-frame hive managed according to modern principles, the queen will, under favourable circumstances, lay about 2,000 eggs per day, but as the number of eggs she can lay during her life is limited, a queen laying eggs rapidly in a well-worked bar-frame hive soon exhausts herself, and should not be retained for more than two seasons; whereas in the old-fashioned "skep" or straw hive the queen generally laid a very much smaller number of eggs daily, but continued to lay for perhaps four or five years. The queen begins to lay early in spring if the conditions are favourable, commencing in the warmest part of the hive, which is usually the centre portions of the centre comb surfaces, on which the bees congregate, thereby maintaining a high temperature. When, in early spring, it is noticed that the bees are carrying pellets of pollen to the hive on their legs, it is a sign that the queen has begun to lay.

The worker (Fig. 2), like the queen, is a female, but not being fully developed she is not capable of being impregnated by the male bee, and consequently cannot lay eggs which will produce

worker or queen bees: if there is neither a queen nor an occupied queen cell in the hive, it sometimes, but rarely in the case of the common English bee, occurs that one of the workers lays eggs from which drones only are produced. Such bees, known as

"fertile workers," are most undesirable occupants of a hive; they are rarely found in hives occupied by queens. All the work of the hive is performed by the worker bees: they make wax, which is secreted from their bodies, build the cells, fill them with honey which they alone collect, feed and nurse the young brood, collect propolis, a resinous substance which they find in trees, and which is used for closing chinks and holes, defend the hive from enemies, etc., etc.; they also gather the pollen of flowers, which, when mixed with honey and partially digested, is fed to the young brood. The length of life of a worker bee varies very much. Bees that are employed to the fullest extent of their powers in making wax and afterwards collecting honey, do not live for more than six or eight weeks of the spring or summer: the making of wax is a greater tax upon their strength than any of their other numerous duties; therefore the life of a bee can be much lengthened by providing it with "comb foundation" (32). Bees hatched in autumn may live for eight or nine months, having neither to make wax nor to collect honey until the following year. A worker bee is provided with a barbed sting, which is used as a weapon of offence or defence; being barbed it cannot easily be withdrawn when inserted in the flesh of a human being. Workers carry honey in the "honey sac," and pollen on their hind legs.

Drones (Fig. 2), or male bees, are hatched early in summer, at which period there may be several hundred in a hive, but only a few of them are

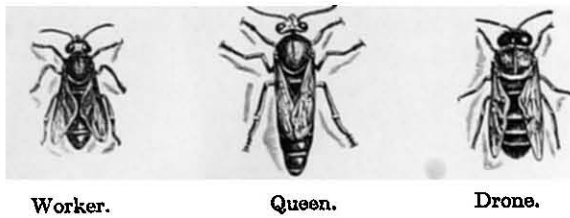
8. Drones.

apparently required as mates for the young queens. The drones lead an idle life; the principal object of their existence is to fertilize young queens; they also, to some extent, assist in keeping up the temperature of the hive. During autumn, or even earlier if the honey flow has ceased, the workers turn them out of the hive to perish, provided that the stock has a fertile queen: if this does not occur, the beekeeper may conclude that the queen is either dead or unfertile. It should be the object of the beekeeper to keep down drone breeding as much as possible.

The comb (Fig. 3) consists of six-sided wax cells, sloping slightly upwards from base to mouth. A midrib

9. Comb.

of wax forms the base of the cells on both sides of the comb. Worker cells measure about one-fifth of an inch, and drone cells about a quarter of an inch between their parallel sides. Honey and pollen are stored in worker and drone cells. Another cell, called the "queen cell" (A, B, and C, Fig. 3), made specially for cradling young queens, is much larger in every way than worker or drone cells, and in no way resembles them. Queen cells are somewhat like an acorn in shape, more or less pitted on the surface, about an inch long, and usually attached to the outer edges of combs.



Worker.

Queen.

Drone.

FIG. 2.—THE HONEY BEE.

(From "Bees and Bee-keeping," by Cheshire, *now out of print.*)

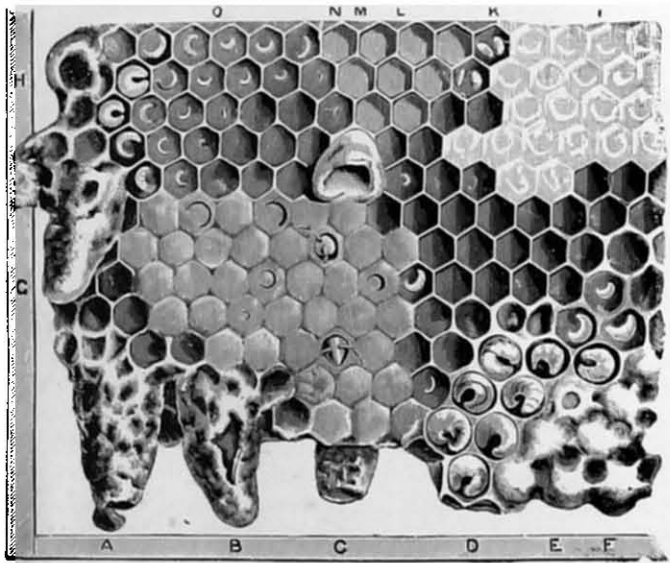


FIG. 3.—HONEYCOMB, natural size.

(From "Bees and Bee-keeping," by Cheshire, *now out of print.*)

A, Queen cell, from which Queen has hatched, showing lid open. B, Queen cell torn open at side. C, Queen cell cut down by bees. D, Drone grubs. E, Drone cell, partly sealed. F, Drone cells, sealed. H, Old Queen cell. O, Eggs and larvæ in various stages. M, Aborted queen cell on face of comb. K, Fresh pollen masses.

In the left centre of the comb are shown sealed worker cells, with some workers biting their way out. In the right hand upper corner are shown sealed honey cells.

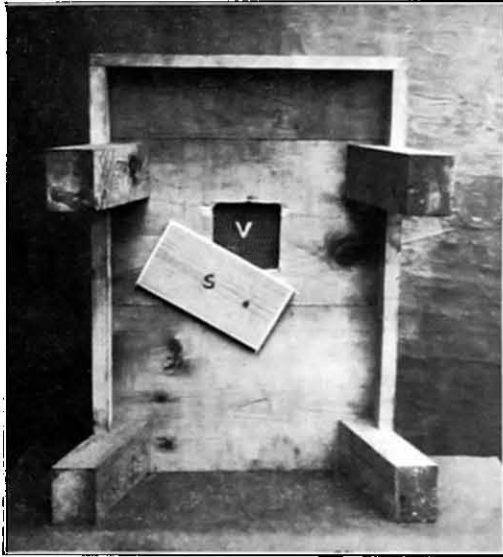


FIG. 4.—FLOOR-BOARD OF C. D. B. HIVE.

V, Ventilating hole covered with perforated zinc.
S, Shutter. Note, floor-board ventilators are unnecessary if hive is fitted with "Swiss" entrance.

The eggs, larvæ or grubs, and the young bees before they emerge from the cells in which the eggs were laid,

10. **Brood.** are called the "brood," Under normal conditions the egg remains as such for three days, after which the grub or larva appears (O, Fig. 8). The grub is fed by the worker bees for from five to eight days; the mouth of the cell is then sealed over. The time passed in these, the earlier stages, varies, as indicated in the following table, which should be committed to memory:—

	Approximate Number of Days in each Stage.			
	Egg.	Grub or Larva.	Pupa in Sealed Cell.	Age when Bee leaves the Cell.
Queen,	3	5	7	15 days.
Worker.	3	6	12	21 "
Drone,	3	8	14	25 "

When full-fed the grub or larva spins a cocoon, within which it becomes transformed into a nymph or pupa, which after a final moult becomes a young bee. The brood in all its stages requires great warmth.

When a stock has so increased in numbers that the bees have not room enough to work, a swarm or new colony is sent out, provided that there are unhatched queens in the hive to take the place of the old one, who will leave with the first swarm, which consists chiefly of the older bees. Although only one fertile queen is necessary for one stock, the workers often have as many as ten to fifteen queen cells in the hive. When the most advanced of the young queens is about to emerge from her cell, the old queen attempts to destroy her; but if the bees intend to swarm they do not permit this, and the queen and bees of the hive get into a very excited state; hundreds of bees fly about near the hive, and finally the old queen leaves with a swarm consisting of some thousands of bees, taking with them sufficient provisions to last about four days. After circling about in the air for a few minutes they settle on some suitable object, usually a bush or the branch of a tree, and there await the return of scouts, sent out to find suitable quarters for the new colony. The bee-keeper should then get the main body of the bees, with the queen, into a hive as soon as possible (93), (76), for if he waits until the scouts return, the bees that have settled will rise and follow the scouts to a distance of perhaps several miles. The stock from which a swarm has issued, though it consists of the younger bees, is called the "parent stock," and, as a rule, provides very little surplus honey after the swarm has left. A strong natural swarm would weigh from four to six pounds, and would contain about 4,000 to 5,000

bees per pound in weight; the number of bees per pound varying according to the amount of food store they carry. See also Section (XI.). An artificial swarm would have more bees per pound (170).

When the oldest of the young queens comes out of her cell, she will if permitted kill her younger sister queens. If prevented from doing so, she will quit the hive with a swarm consisting of the strongest of the bees remaining after the "top" swarm has left; this generally takes place on the eighth or ninth day after the "top" swarm has left, and this after swarm, or any subsequent swarm, is called a "cast." If not checked this may be repeated again and again as each young queen leaves its cell, and perhaps several queens hatched out on the same day will leave the hive with one cast. In this latter case, if the cast is hived, all the queens except one will be killed.

As repeated swarming exhausts the parent stock, rendering it absolutely unprofitable for a long period,

13. Prevention of Casts. It should be prevented; this can be done effectually by adopting the practices recommended in paragraphs (95) and (96) for the treatment of swarms. If, however, this cannot be done, owing to the sale or loss of the top swarm, all queen cells except one, which should preferably be an uncapped queen cell containing larva, should be removed from the combs when the first swarm issues; and if a second swarm issues, remove all queen cells, and return the after swarm or cast to the parent stock on the evening of the day it issued (76).

The young queen in the parent stock does not lay until about seventeen to twenty-one days after the top swarm has left, before which all the worker young mated Queen brood will be hatched out; so that if a will lay Eggs. hive is examined on the twenty-first day after swarming, no worker brood except possibly eggs will be found. It is important that this should be borne in mind when transferring bees from fixed-combs into frame hives, for if this is done on the twenty-first day after the top swarm has left, no worker brood can be lost.

Bees generally work within about a mile of the hive, but if the supply of honey within that area is in-

15. Range of Flight of Bees. sufficient, they will go further, but rarely beyond two miles from the hive. On returning they fly straight to the exact spot on which their hive stood, and many would be unable to find or recognise it if, during their absence, it had been removed even the short distance of six feet; this should be borne in mind when for any purpose a hive is moved from its place (182). It should only be moved when the bees have ceased flying for the day, and by short stages of four feet when there is only one hive,

or two feet if there are other hives close by. The bee-keeper can profitably take advantage of this habit of the bee when he wishes to make artificial swarms (XXIII).

When, in the early summer, the beekeeper observes that few of the bees are carrying balls of yellow pollen on their hind legs, while many are flying rapidly to and from the hive, he may conclude that "the honey-flow" has commenced. He should then make sure that plenty of empty comb is provided in the super (XIII.) for the storage of the honey.

Honey as gathered by the bees contains certain gases and an excess of water, but after a short time the warmth of the hive causes the gases and water to evaporate, and the honey becomes "matured" or "ripe." The time required to bring about this change depends very much on the heat of the hive, and this is one of the reasons why it is desirable to keep hives warmer in summer than in winter. When the honey is ripe, but not before, the bees will cover over the cells with a thin film of wax, which is called "capping," and the beekeeper can thus easily distinguish ripe from unripe honey.

III. HIVES, APPLIANCES, ACCESSORIES, AND THEIR USES.

Much of the success achieved in modern beekeeping is due to the great improvement effected in the form of hive used. The production of honey for sale or consumption can be carried on much more profitably by using bar-frame hives instead of skeps or fixed-comb hives; this is now so universally admitted that it is not necessary to specify the advantages of bar-frame hives. The type of bar-frame hive recommended for use and described in this manual is known as the "C. D. B." hive (Fig. 1). This hive, and others of a somewhat similar design as regards size and detail, possess the following good points:—

- (a.) They provide ample space to permit of the queen being enabled to utilise her laying powers to the fullest extent.
- (b.) The construction is such that the hive can be taken asunder, thus facilitating the cleansing or examination of any part.
- (c.) The capacity of the hive can be increased as occasion may require for storing surplus honey above the brood chamber, and it may be contracted so as to be thoroughly suitable for wintering bees (130).

As this type of bar-frame hive, with the frames hanging parallel to the hive front, is in general use in Ireland, and as it

is the type recommended for use, it is to be understood that the instructions given in this manual are intended for persons using the "C. D. B." type of hive; those who use hives of other types will doubtless perceive in what respects the instructions given require modification in order that they may be applicable to the particular type of hive in use. It should be clearly understood that there are other hives very similar in general design to the "C. D. B." hive, but differing therefrom as to details.

The "C. D. B." hive (Fig. 1) is made in four parts, the floor-board, body-box, lift, and roof, which are described in the following paragraphs. It should be constructed throughout of yellow pine, or wood of similar quality. Hives made of deal are cheaper, but unless well-seasoned wood is used, they frequently prove unsatisfactory, as the wood is likely to warp and get out of shape.

19. "C. D. B."
Hive.

(1.) The floor-board (Figs. 1, 4, and 81) is a movable wooden stand, resting on four stout legs, about six inches high. The sloping portion is the "alighting" or "flight" board, and projects in front of the hive door. If the hive is fitted with a Swiss entrance (21) a floor ventilator is not essential, but if it is desired to have one, a ventilating hole about four inches square is cut rather to the front of the centre of the floor board, covered on the top with perforated zinc, and fitted with a wooden shutter underneath.

(2.) The body-box, or "brood chamber" (Figs. 1 and 81), rests on the floor-board, and overlaps it at the sides and back. This part of the hive is the permanent home of the bees. In it the frames are suspended in which the brood

21. Body-Box of
C. D. B. Hive.

is raised and the winter food supply is stored. It should be made to contain eleven frames (24), and a dummy (25): if desired it may be increased in length to hold 14 frames: this size is specially desirable when stocks are being worked up for extracting. The flight board is protected by a movable wooden porch.

The body-box should be fitted with Edmondson's Improved Swiss entrance (Fig. 8), which is made of metal and fitted with screws by which it is fixed to the body-box: the sliding doors are slotted to provide ventilation; they may be closed to meet, or withdrawn to provide an entrance $8\frac{1}{2}$ inches wide; the upper section is fitted with slots running on the attachment screws to permit of its being moved up and down so that the entrance may be reduced to five-sixteenths inch in height or raised to three-quarters of an inch. This fitting, which only costs 6d., should be attached to all hives, as it provides for ample ventilation, and for protection against mice and robber bees.

(3.) The lift, or raiser (Figs. 1 and 87c), serves to raise the roof sufficiently to permit of crates (29) of sections, or boxes of frames for extracting (31), being placed above the body-box, so that the bees can obtain access to them from the brood chamber in order to fill the sections or super frames with surplus stores of honey for removal. In winter the lift should be inverted and slipped down over the body-box (130). A second lift (111) can be fitted over the lower lift, when it is desired to place more than three crates of sections on the hive.

22. Lift of C. D. B. Hive. (31), being placed above the body-box, so that the bees can obtain access to them from the brood chamber in order to fill the sections or super frames with surplus stores of honey for removal. In winter the lift should be inverted and slipped down over the body-box (130). A second lift (111) can be fitted over the lower lift, when it is desired to place more than three crates of sections on the hive.

(4.) The roof (Fig. 1) serves only as a protection from the weather; not to confine the bees. It is fitted in front with two perforated brass cones (42), forming a non-return bee escape, and at the back with a perforated zinc ventilator.

23. Roof. fitted in front with two perforated brass cones (42), forming a non-return bee escape, and at the back with a perforated zinc ventilator.

Bar-frames are of the pattern known as the "Abbott" bar-frame (Figs. 1, 10 and 81). They vary from the dimensions of the "Standard" frame as fixed by the British Bee-keepers' Association, in that the top bar is half-inch thick, instead of being only three-eighths inch thick, as specified for the "Standard" frame; this extra thickness of the top bar is given to prevent sagging; these frames can be used in any hive constructed to take "Standard" frames, but should not be used in the same hive with "Standard" frames unless the latter are raised to the same level by fixing slips of wood one-eighth inch thick under the shoulders of the "Standard" frames; otherwise the eighth-inch spaces above the shoulders of the "Standard" frames would be filled with propolis by the bees when the section crates are on (110). The under side of the top bar of the "Abbott" frame is fitted with two machine-cut grooves to receive foundation (33), (73). The frames are kept at the correct distance apart by the shoulders at each end of the upper bar. Bar-frames should be made with the greatest accuracy as to measurement so that they may all be exactly of one size; it is therefore best to buy machine-made frames rather than to make frames at home, which is almost certain to prove unsatisfactory. The dimensions of the "Abbott" bar-frame as here described are as follows:—Extreme width of top bar, 17 inches; extreme breadth of shoulder, $1\frac{1}{2}$ inches; width of top bar between shoulders, about $\frac{7}{8}$ inch; extreme width from outside to outside of perpendiculars, 14 inches; depth of frame from under side of top bar to under side of bottom bar, 8 inches; depth of top bar, $\frac{1}{2}$ inch.

24. Bar-Frames. the dimensions of the "Standard" frame as fixed by the British Bee-keepers' Association, in that the top bar is half-inch thick, instead of being only three-eighths inch thick, as specified for the "Standard" frame; this extra thickness of the top bar is given to prevent sagging; these frames can be used in any hive constructed to take "Standard" frames, but should not be used in the same hive with "Standard" frames unless the latter are raised to the same level by fixing slips of wood one-eighth inch thick under the shoulders of the "Standard" frames; otherwise the eighth-inch spaces above the shoulders of the "Standard" frames would be filled with propolis by the bees when the section crates are on (110). The under side of the top bar of the "Abbott" frame is fitted with two machine-cut grooves to receive foundation (33), (73). The frames are kept at the correct distance apart by the shoulders at each end of the upper bar. Bar-frames should be made with the greatest accuracy as to measurement so that they may all be exactly of one size; it is therefore best to buy machine-made frames rather than to make frames at home, which is almost certain to prove unsatisfactory. The dimensions of the "Abbott" bar-frame as here described are as follows:—Extreme width of top bar, 17 inches; extreme breadth of shoulder, $1\frac{1}{2}$ inches; width of top bar between shoulders, about $\frac{7}{8}$ inch; extreme width from outside to outside of perpendiculars, 14 inches; depth of frame from under side of top bar to under side of bottom bar, 8 inches; depth of top bar, $\frac{1}{2}$ inch.

The division-board, usually called the "dummy" (Fig. 5), is used for separating that portion of the body-box to which the bees have access from the portion from which they are excluded; it is a board the full depth of and almost the full width of the body-box, strengthened by two.

25. Division-board or Dummy. from the portion from which they are excluded; it is a board the full depth of and almost the full width of the body-box, strengthened by two.

perpendicular laths nailed to the back of the board to prevent it from warping, some soft pliable material being inserted between the boards and the laths in such a manner that it slightly projects at each side. This board is rigidly attached to an upper bar $16\frac{1}{2}$ inches long, $\frac{7}{8}$ inch wide and $\frac{1}{2}$ inch thick, in such a manner that the front edge of the upper bar shall project $\frac{3}{8}$ inch beyond the face of the dummy, the whole being so constructed that when the division board is placed in position it shall fit so closely to the sides and bottom of the box as to prevent the passage of bees or air from the rear to the front side of the dummy or vice versa, and that it shall remain in position as fixed.

The quilt (Figs. 1 and 34) is a strong canvas covering, made about 17 inches wide, and of the full length of the body-box, so that it shall be large enough to cover the upper bars of all the frames and the dummy when the body-box is full of frames, and thus to confine the bees to the brood chamber. Upon it are placed other warm coverings of the same shape, preferably made of woollen material, the number of such coverings varying at different seasons according to the temperature it is desired to maintain in the brood chamber. Woollen material should never be placed next the bees, as it irritates them.

The kind of section recommended for use is that known as the "D" section (Figs. 1 and 6), made in one piece to hold approximately one pound of honey in the comb. It is supplied in the flat, and consists of a piece of thin wood, jointed in three places with V joints by being partly cut through, so that it can be bent into a square measuring externally $4\frac{1}{2}$ inches by $4\frac{1}{2}$ inches by 2 inches, and fastened by dovetails, which unite it at the fourth corner.

Separators (Fig. 1) are thin sheets of wood which are inserted between the sections when the latter are placed in crates, to prevent the bees from drawing out the comb beyond the proper width. They are made in two sizes—the long separator is for use in the "Economic" crate (29); the short separator is for use in the "Divisional" crate (30). Tin separators are not recommended; they are more expensive than wood, and are liable to buckle and rust.

The "Economic" section-crate (Fig. 6) is a four-sided wooden frame large enough to hold twenty-one two-inch wide one-pound sections, which are placed in three rows resting on wooden rails attached to the under-side of the crate; the sections are firmly pressed to the front of the crate by means of a wooden board called a "follower," made the full width of the crate internally, and kept in position by one or more springs wedged in between the "follower" and the back of the crate.

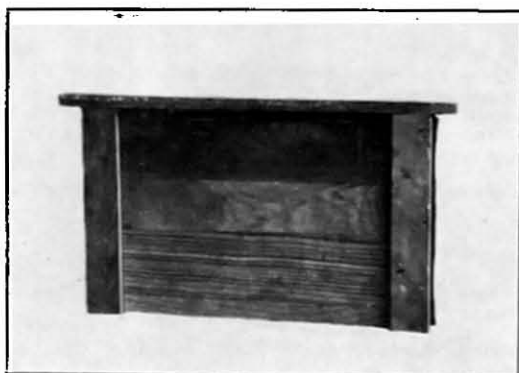


FIG. 5.—DIVISION BOARD OR DUMMY.

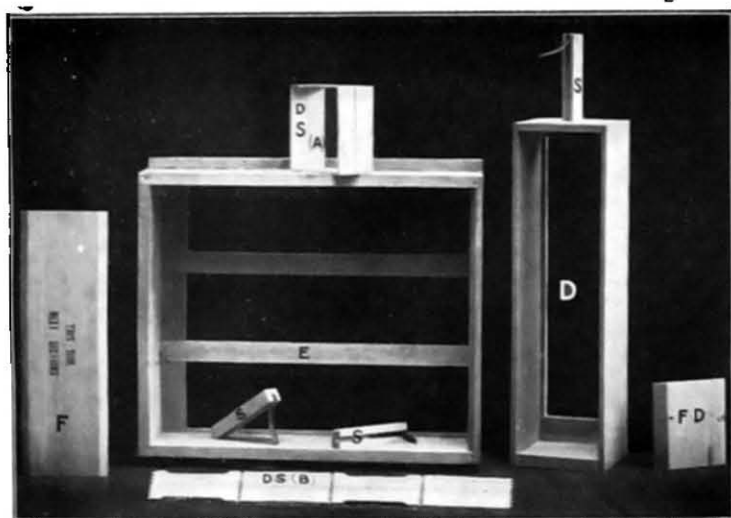


FIG. 6.—SECTION CRATES.

E, Economic Crate, the back of crate being next the follower.
 F, Follower. D, Division of Divisional Crate. F.D, Follower of Divisional
 Crate. DS (A), D. Section folded. DS (B), D. Section in flat. S, Spring
 for keeping follower in position.

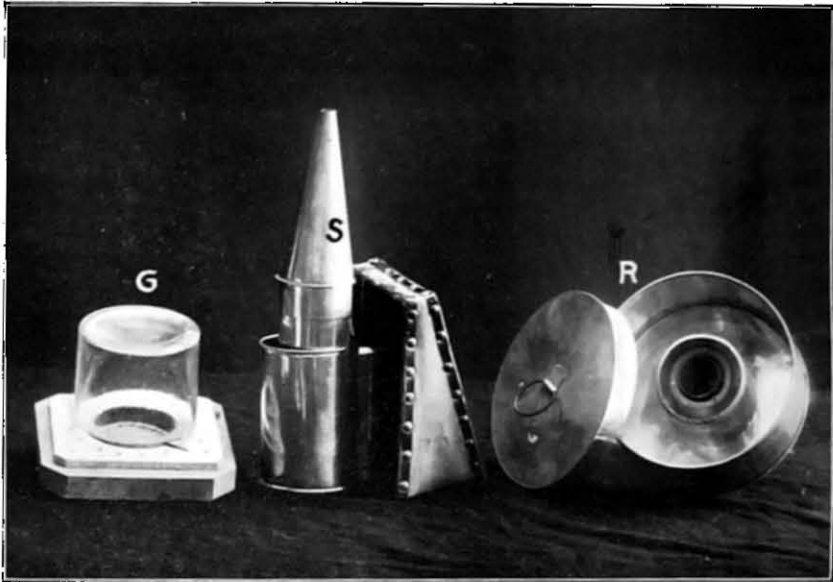


FIG. 11.—FEEDERS AND SMOKER.

G, Graduated Bottle Feeder. R, Round Tin Feeder. S, Smoker.



FIG. 12.—CONE BEE-ESCAPE.

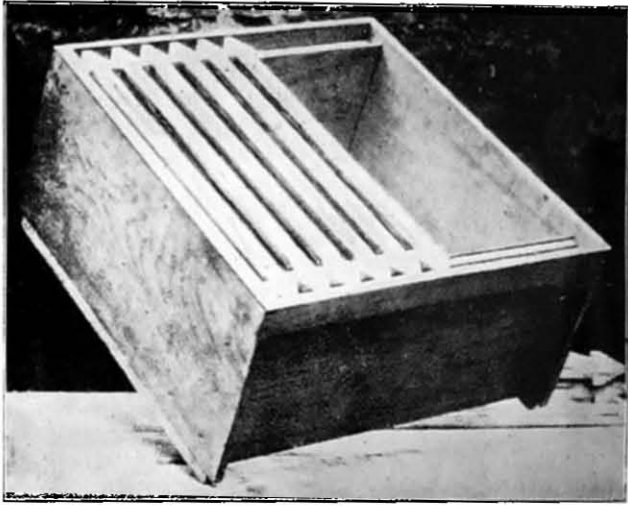


FIG. 7.—DOUBLING BOX.

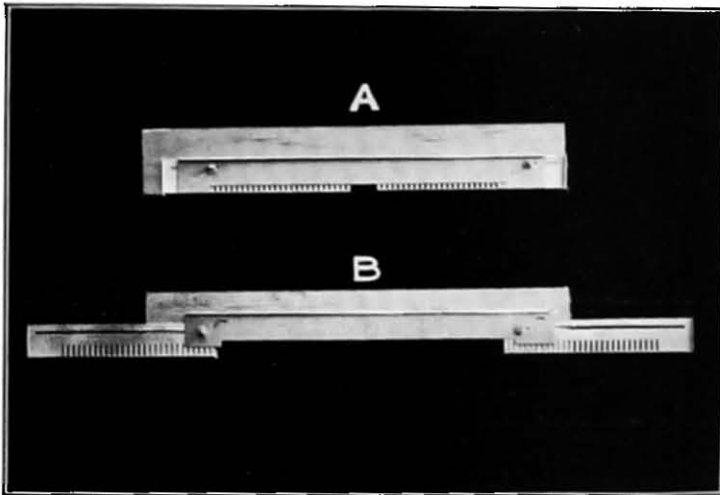


FIG. 8.—EDMONDSON'S IMPROVED SWISS ENTRANCE.

A, Entrance arranged to give a very small opening. B, Entrance fully opened.

The upper and lower edges of the "follower" should be so bevelled on one side as to provide a bee-way between the section and the "follower"; the bevelled side should be turned towards the sections. The inner edges of the front board of the crate are similarly bevelled. The spaces between the rails on which the sections rest are blocked by slips of wood to a distance of $1\frac{1}{2}$ inches from the back of the crate, so as to prevent bees passing up behind the follower.

The "Divisional" section-crate (Figs. 1 and 6) is similar in principle; it consists of three separate crates, each capable of holding seven two-inch wide one-pound sections in one row; the three divisions, holding twenty-one sections in all,

30. Divisional Section-crate.

may be placed on the hive together, or one or two divisions may be used, as necessitated by circumstances; it is principally intended for use when the honey flow is restricted, at which period it is often advantageous to remove completed sections, leaving on the hive those which have not been filled. If it is desired to use the divisional crate in lieu of an economic crate, it is advisable to screw laths to the front and back of the three divisions, so that they may be used as one crate. Many bee-keepers use the "economic" crate only.

The "doubling"-box (Fig. 7) is a box to hold ten bar-frames; it is somewhat similar in construction to the body-box, on which it is placed when in use (120); it is only used when it is desired that the bees shall store honey in frames from which it is afterwards to be extracted (124). The "doubling"-box is often referred to as a "super"-box. A hole $\frac{3}{8}$ inch in diameter should be bored about $\frac{1}{4}$ an inch from the bottom of the front of the "doubling"-box to permit of the escape of drones therefrom, this hole to be fitted with a wood or cork plug, so that it may be opened occasionally.

31. Doubling-box.

Two kinds of comb foundation are required, "brood" or "frame" foundation, and "super" or "section" foundation. The make known as "weed" foundation is considered the best; inferior foundation is liable to stretch, thereby producing badly-shaped combs, which cause trouble in the brood frames and reduce the value of sections. Foundation should be stored in a dry room at a moderate or warm temperature; if kept in a damp room it will be mildewed, and if stored in a cold room it will become brittle. When foundation is mildewed or brittle it should not be used in frames nor in sections until its original colour and pliant condition have been restored by warmth: a convenient method of doing so is to hold the sheet of foundation at a moderate distance from a fire, first placing the foundation in frames or sections, or else using paper or any other suitable material to prevent the fingers coming into contact with the sheets of foundation when holding them.

32. Comb Foundation.

Frame foundation (F, Fig. 9) should be used for all frames, whether they are required for the brood chamber in the body-box, or for the doubling-box for extracting. It can be purchased in sheets cut to the correct size to fit standard frames; it varies in thickness, sheets of weed foundation running from about eight to eleven per pound; sheets weighing eight to the pound are recommended as suitable. It should not be used in sections, as often it is not made of pure wax, and its thickness would spoil sections.

33. Frame Foundation.

“Section foundation” (S, Fig. 9) should be used in sections only; it is supplied in different-sized sheets; the most convenient size for general use is that made for insertion in three sections, and measures about $12\frac{1}{2}$ inches by about $4\frac{1}{2}$ inches. The full sheets, measuring $12\frac{1}{2}$ inches by $8\frac{1}{2}$ inches, weigh about sixteen to nineteen to the pound. Section foundation should not be used in frames.

34. Section Foundation.

Wiring and embedding appliances (Fig. 10) are used for wiring frames and embedding the wire in foundation; those recommended for use consist of an embedding-board (36) fitted for use with “Abbott” frames; an embedder (37); a fine bradawl (A, Fig. 10), and a coil (C, Fig. 10) of No. 30 gauge tinned wire.

35. Wiring and Embedding Appliances.

The embedding-board (B, Fig. 10) for use with the “Abbott” frame, is a wooden board, which should measure 18 inches wide by $7\frac{1}{2}$ inches deep, by $\frac{1}{2}$ -inch thick. Across it are tacked two slips of wood, $9\frac{1}{2}$ inches long, $\frac{3}{8}$ -inch thick, and about one-inch wide, so placed that at each end they shall project one inch over the board, that they shall be parallel, at right angles to the board, and $7\frac{1}{2}$ inches apart between their outside edges. The embedding-board is used for marking frames for wiring, and also for embedding the wires in foundation after it has been fixed in the frames.

36. Embedding-board.

The embedder (E, Fig. 10) is a piece of iron $\frac{1}{4}$ -inch thick, set in a wooden handle, the opposite end being sharply curved, slightly pointed, and fitted with a groove to take a piece of No. 30 wire. When required for use the iron is heated sufficiently to melt beeswax when brought into contact with it. The iron will retain heat long enough to permit of several sheets of foundation being embedded without reheating it.

37. The Embedder.

Many patterns of feeders are used. Suitable feeders for general use are the graduated glass feeder (Figs. 38. Feeder. 11 and 34), which is specially suitable for slow feeding, and the round tin feeder (Fig. 11), which is specially suitable for quick feeding. The

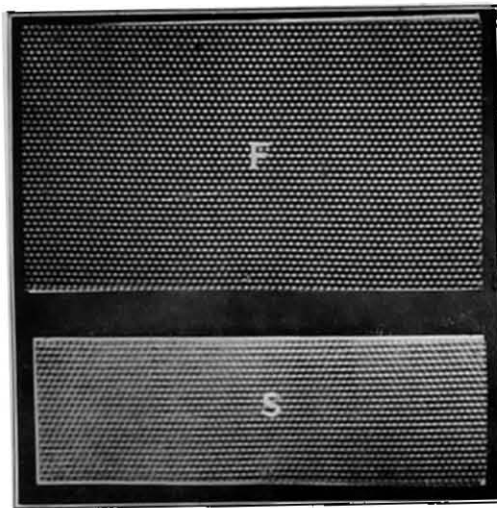


FIG. 9.—COMB FOUNDATIONS
 F, Frame foundation. S, Section foundation

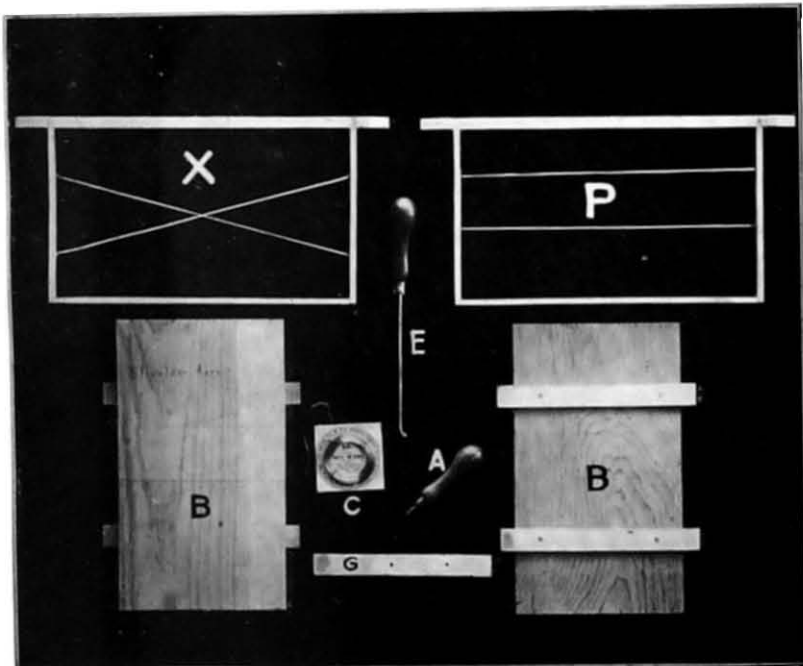


FIG. 10.—WIRED FRAMES AND WIRING APPLIANCES.
 X, Frame wired for extracting. P, Frame wired for brood chamber.
 E, Embedder. B, Embedding Board. C, Coil of Wire. A, Awl. G, Gauge
 for wiring.

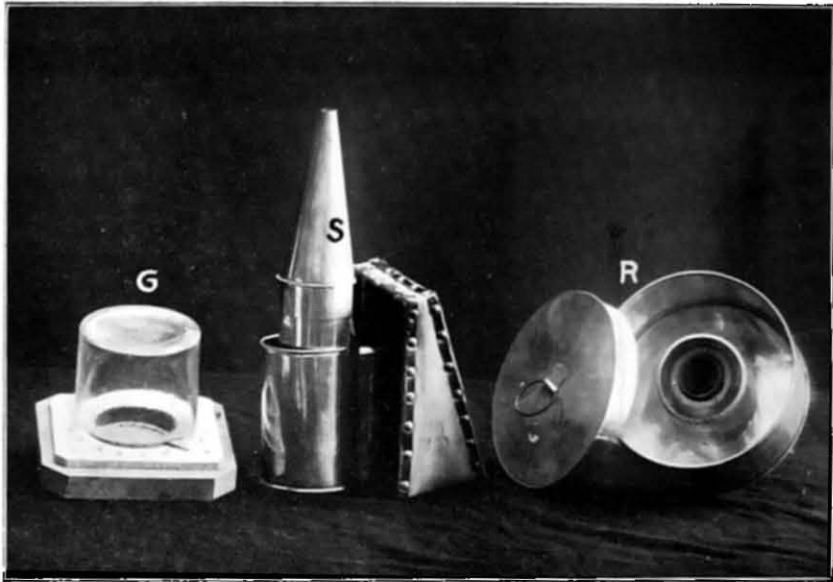


FIG. 11.—FEEDERS AND SMOKER.

G, Graduated Bottle Feeder. R, Round Tin Feeder. S, Smoker.



FIG. 12.—CONE BEE-ESCAPE.

graduated glass feeder consists of a glass jar which when in use is inverted over a tin plate inserted in a hollowed-out wooden stage (Fig. 11); the jar is closed by a metal screw cap, in which are pierced nine holes, one or more of which may, by turning the jar, be exposed at will over a curved slot cut in the tin plate, the number of holes exposed at any time being indicated by a pointer. The round tin feeder (Fig. 11) is a thoroughly good one, especially for quick feeding. It consists of a tin cylinder, of about $1\frac{1}{2}$ pint capacity, so constructed that when placed over a hole in the quilt, the bees obtain access to the syrup by passing up a tube in the centre of the feeder. It can be readily filled on removing the lid.

Beat in with a hammer the bottom of a lever-lid one pound tin, so as to provide a $\frac{3}{8}$ -inch deep space under

39. Cheap Feeder for Slow Feeding. Bore two or three very small holes in the bottom of the tin about the centre with a very fine awl or the point of a darning needle, each hole just large enough to permit one drop of syrup to pass in every two seconds. When in use, place the tin over a hole on the quilt, and pack around it. To refill the tin, do not remove it, but remove the lid, fill, and then press the lid down again tightly. The vacuum which will be created will prevent the syrup from flowing out until drawn off by the bees.

Use an ordinary one or two pound glass jam jar, the mouth of which should be covered by a piece of butter muslin tied on after filling the jar with syrup. Make a wooden stage to hold the mouth of the inverted jar. This may

40. Cheap Feeder for Quick Feeding. be done by cutting a circular hole a little wider than the mouth of the jar out of two pieces of wood, each about eight inches square, then place a piece of perforated zinc rather larger than the holes, between the boards, and tack the two boards firmly together so that the hole in one board shall be exactly over that in the other, and that the zinc shall cover the entire hole. When required for use, the jar containing syrup is inverted on to the zinc, and the whole stage is placed over a hole cut in the quilt (102).

The super-clearer (Fig. 1) is a close sheeted frame of wood, of such dimensions that when placed under a

41. Super-clearer. section-crate (29) or doubling-box (31) it is impossible for any bees in the crate or doubling-box to pass therefrom except through a trap bee-escape fitted in the centre of the frame, through which bees can freely pass from the crate or doubling-box to the body-box or crate of sections on which the super-clearer has been placed, but through which they cannot return into the doubling-box or crate which it is desired to clear. The trap which has been in general use for some time is known as the "Porter bee-escape"; it has proved thoroughly effective. Another very good form of bee-escape has been introduced by the Irish Bee-keepers' Federa-

tion. Another trap with four exits may be used ; it permits of clearing supers more rapidly than when a single trap is fitted. When the super-clearer is in use, it should be placed with the round entry hole to the bee-escape, upwards, under the crate of sections to be cleared.

The cone bee-escape (Fig. 12) consists of two perforated brass cones, flanged at the base. They are fitted

42. Cone Bee-escape. to the roof, at the front ventilating hole ; one is inserted through the hole from inside, the cone projecting in front, the flange being tacked to the inner side of the roof-front, while the second cone is tacked to the outer edge of the same hole, thus projecting immediately in front of the inner cone, leaving a space equal to the thickness of the wood between the apertures of the cones ; this permits bees to have free egress from the hive, but prevents the ingress of bees or wasps. A single cone as fitted on some hives permits the ingress of wasps, and to some extent of bees.

The subduing cloth (Figs. 1 and 21) is used for subduing bees ;

43. Subduing Cloth. it should be made of coarse canvas, gardener's scrim, or some similar material. Scrim possesses the merit of permitting the bees to be more easily seen through it than

is possible when a material of closer texture is used. The cloth should be 18 inches long by 17 inches wide, with a broad hem on the 17-inch side, wide enough to permit of the insertion therein of a light stick about 17 inches long, a full length of 18 inches being left exclusive of the hem ; a cloth thus fitted, greatly facilitates manipulation, especially when only one hand is available for that purpose. When required for use the cloth should be thoroughly damped with subduing solution (180). When not in use it may be preserved in a damp condition, if kept in a tin canister or other suitable vessel with a close-fitting lid.

The smoker recommended for use is of the " Bingham " pattern (Fig. 11), and consists of a small hand

44. Smoker. bellows attached to a tin cylinder in which is placed the material to be burnt ; the cylinder is fitted with a conical nozzle, through which the smoke is ejected. The best fuel is dry rotten wood, as it leaves little residue except ash, and smoulders well. Brown corrugated paper is the next best material ; when used it should be loosely rolled up. Rags should not be used, as they tend to foul and clog the apertures in the smoker. The wood or paper should be lighted and thrust smouldering into the cylinder, the burning end downwards. The fuel will continue to smoulder when not in use, if the smoker is placed nozzle upwards. If the smoker becomes clogged, the cylinder should be detached from the bellows, to which it is fastened by screws, and opened so that the tube connecting the bellows and cylinder may be cleaned



FIG. 13.—OPERATOR WEARING VEIL AND SLEEVELETS
WHILE EXAMINING A HIVE.



FIG. 14.—APPLIANCE-BOX.

out. The mouth of the nozzle and the perforated disc at the base of the nozzle should be frequently cleaned.

The veil (Fig. 13) is used to protect the head and neck from the attacks of bees. It should be made of fine

45. **The Veil.** netting, roomy enough to cover in the wearer's hat, and long enough to permit of its being tucked in under a man's coat, or when used by a lady, drawn down to a peak on the back and chest and attached by safety pins to the clothes. A net bag about two feet deep will usually be found suitable. The part of the veil in front of the face should be dark; light colours impede the vision; the rest may be of any colour. Veils for the use of men are frequently made with a hole at the top, which is bound with elastic to grip the crown of the hat; but the bag veil above recommended suits most head-gears, except ladies' large hats. Woven wire veils are not recommended.

Sleevelets (Fig. 13) are made of calico or any other suitable material. They are about six inches long

46. **Sleevelets.** and fitted with elastic at each end. When in use, one end is slipped over the end of the coat sleeve, the other grips the wrist, thus preventing bees from creeping up inside the sleeves. They will be found most useful when handling bees, especially in the evenings or in cold weather, under which circumstances bees are specially disposed to creep.

It is recommended that the beekeeper should possess an "appliance-box" (Fig. 14), in which ap-

47. **Appliance-box.** pliances usually required at the apiary may be kept in a suitable dry place, to be carried out to the apiary when required for use. A plain wooden box about eighteen inches long, nine to twelve inches wide, and nine inches deep, fitted with a hinged lid and a handle, will serve the purpose well. In it the following articles, as well as any others for which the individual beekeeper has a preference, should be kept:—A table knife, turn-screw or chisel, goose or duck wing, tin of petroleum jelly, bottle of subduing solution (180), subduing cloth (43) in tin, and stick for cloth, spare frames containing comb or foundation, veil, sleevelets, note book, and smoker, if used.

Queen excluder zinc (Fig. 1) is sheet zinc perforated with oblong holes, through which the worker bees can,

48. **Queen Excluder.** but the mated queen and drones cannot pass. Its use is to confine the queen to the brood chamber or to a particular portion of the brood chamber. Wilkes' wire queen excluder (Fig. 1) is in every way better than excluder zinc, but dearer; it is strongly recommended for use in lieu of excluder zinc.

The extractor (Fig. 15) is a machine by which honey may be removed from the comb by centrifugal

49. The Extractor. action, after which the empty comb may be returned to the hive to be refilled (124).

There are a number of different patterns of extractors on the market, all constructed more or less on the same principle, but varying considerably in price. The extractors illustrated in Fig. 15 are the "Marvel," costing, with gearing and covers, 23s.; and the improved "Cowan," costing 50s.; both made by W. P. Meadows, Syston, near Leicester. Each of these extractors is fitted with two movable open-meshed wire cages, each cage capable of holding one frame or six one-pound sections of honey; the cages are held in a revolving iron frame attached to a central spindle worked by a handle operating cogged gearing. The "Marvel" extractor is smaller, lighter, and of cheaper construction throughout than the "Cowan." The "Cowan" machine is fitted with reversible swing cages, which enables the operator to extract from each side of a frame without removing the frame from the cage as is necessary when using the "Marvel." Each machine can be readily taken to pieces for cleaning.

The ripener (E, Fig. 15) is a tinned iron cylinder fitted with a treacle tap at the base. Its use is

50. Ripener. to hold extracted honey while ripening (124). Unripe honey being lighter than

ripe honey, the latter gradually settles below the former and can be drawn off by the tap.

The Strainer (F, Fig. 15) is a tin vessel constructed to fit on the top of the ripener, and to which a piece of

51. Strainer. canvas, jute, or other suitable material may be attached, for the purpose of straining

the honey as it passes from the extractor to the ripener. Strainers are made in different patterns at varying prices. The type shown in F, Fig. 15 will be found suitable.

The uncapping-knife is used for uncapping combs in frames or sections prior to extracting. The pattern

52. Uncapping-knife. illustrated (G, Fig. 15) is called the "W. B. C." knife; it is slightly curved.

A large table knife may be used for uncapping, but it is not at all so suitable as a special uncapping-knife.

The frame-box should be made of wood, large enough to hold at least twelve frames, and with a close-

53. Frame-box for carrying Frames for Extracting. fitting lid, and rails on which the frames may be suspended. Handles should be fitted at each end for carrying the box,

and it should be remembered that twelve frames well filled with honey for extracting will weigh about 60 to 70 lbs. A box of the following internal dimensions would be suitable:—25 inches long, 17½ inches broad, 8½ inches deep; a rail 25 inches by 1½ inches by ½ inch to be nailed to each side of the box, at ½-inch

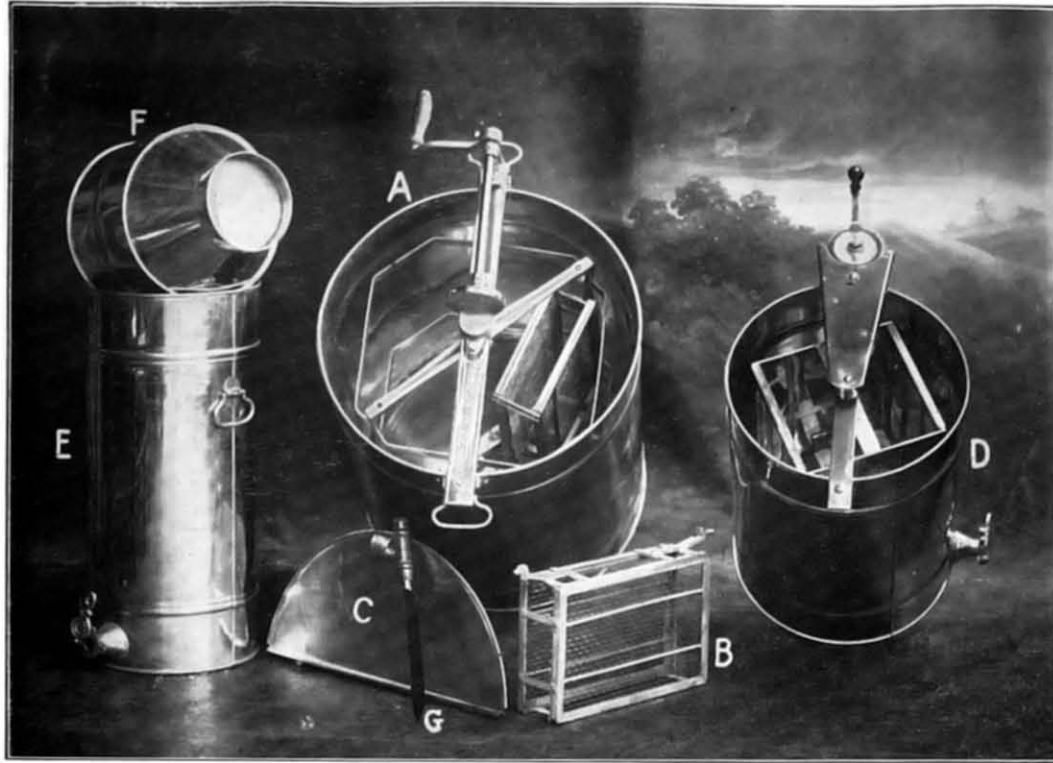


FIG. 15.—EXTRACTING APPLIANCES.

A, Meadow's Improved Cowan Extractor. D, Meadow's Geared Marvel Extractor. B, Frame-cage of Cowan Extractor. C, Part of cover of Cowan Extractor. E, Ripener. F, Strainer. G, Uncapping-knife.



FIG. 16.—HIVING BOARD.

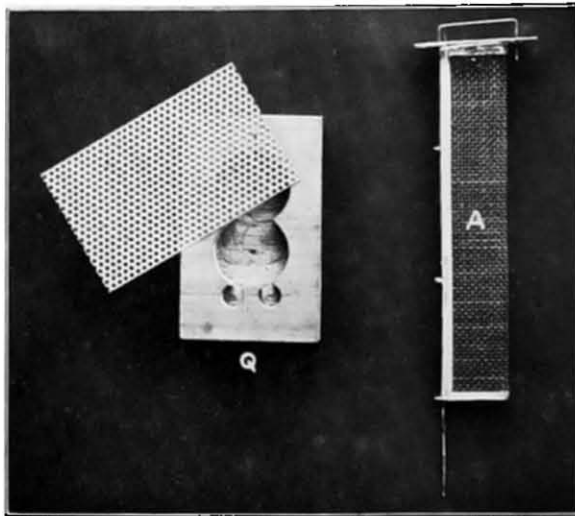


FIG. 17.—QUEEN CAGES.

A, Abbott Queen Cage. Q, Queen Travelling Cage.

below the upper rim. It is to be remembered that comb for extracting is often drawn out more than ordinary comb, so that the frames take up more space than brood frames.

The hiving-board (Fig. 16) is a light board about 3 feet long by 18 inches broad, by about half an inch

54. Hiving-board. thick. Its use is to support the sheet on which bees are thrown when hiving them by the hive entrance (76). It may be made of two nine-inch by half-inch boards, held together by cross-battens underneath. In the "C. D. B." hive, a slip of wood is screwed on under the front of the alighting-board to support the end of the hiving-board when in use, but it is well to nail two small narrow slips of wood, about a foot apart, to the upper side of one of the 18-inch wide ends of the hiving-board, projecting about three inches, so that they may rest on the alighting-board (20); the hiving-board when thus fitted can readily be placed in position, in front of any hive (Fig. 29).

Queen cages are used for introducing queens to stocks; they are made in several patterns, of which it

55. Queen Cage. will suffice to describe two. The "Abbot" queen cage (A, Fig. 17) consists of a zinc frame to which is attached a wire net of fine mesh, the whole forming a cage measuring about 6 inches by $1\frac{1}{2}$ inch by $\frac{1}{8}$ inch; one edge of the cage is open for its full length, leaving an aperture 6 inches by $\frac{1}{8}$ inch; a movable wire which passes through the zinc top and bottom of the cage, and is thus held in position in the centre of the aperture, can be withdrawn so as to permit the imprisoned queen to pass out of the cage; the flanged top of the cage permits of its being suspended between two adjoining frames. The "Dome" cage consists of a metal circular rim about $1\frac{1}{2}$ inches in diameter, covered with a dome-shaped roof of fine meshed netting; when in use the metal rim is pressed to its full depth into the honey comb. This type of cage is recommended; the bees can release the queen by eating away the honey comb, thus sometimes saving the life of a queen that has been overlooked.

The "Abbott" swarm-box (Fig. 18) is intended for forwarding bees by parcel post. It is a light box

56. Swarm-box. made of very thin wood, covered with canvas, and measuring about 18 inches long by 9 inches broad by 9 inches deep; the detachable lid consists of a light wooden frame sheeted with perforated zinc; it rests on slips tacked to the sides and ends of the box; two light movable skeleton frames, to each of which a piece of coarse canvas is attached, are fitted into position about 3 inches apart, as shown in the illustration; a slip of wood is wedged between them to spring them apart. The bees cluster on the canvas frames. The same style of box may be made of light wood; and instead of canvas sheeted frames, strips of canvas,

held in position by cords passed through holes in the box ends, may be substituted.

Nucleus hives are only required for use in summer, and should be large enough to hold four standard

57. Nucleus Hives. frames and a dummy. The nucleus hive (Figs. 19A, 19B) is made in two parts, to take four frames and dummy, and has a detachable roof high enough to permit the use of a feeder; it costs 4s. A nucleus hive may be made by any handy person by following the measurements of the body-box, dummy, and bar-frame of an ordinary hive, except that the nucleus hive need only be 8 inches wide. An ordinary 11 frame, C. B. D. hive, or one of similar type, may be temporarily converted for use as a nucleus hive by inserting two dummies in it, and making an entrance 1 inch by $\frac{3}{8}$ inch half way along one side of the body-box, and another in the centre of the back of the body-box; the back entrance may be formed by boring straight through the back wall of the body-box at the proper height, and the side entrance by cutting a passage sloping upwards through the floor-board and the base of the exterior overlapping side of the body-box thus leaving the inner side wall intact. Fit an alighting-board under each entrance, by tacking a side of a section to a piece of wood screwed on to the hive. The entrance holes may be narrowed by plugging with wood, or may be plugged up entirely when the hive is no longer required for nuclei. The hive may be placed on legs or on a stone.

The following is a list of the appliances and articles which should be procured by anyone who desires to commence beekeeping on the principles recommended in these instructions:—

- 58. Requisites for commencing Beekeeping.**
- (1.) One bar-frame hive, of capacity to take three crates of sections, with 11, 12, 13, or 14 frames and dummy; painted three coats; fitted with roof ventilating cones, and Swiss metal entrance.
 - (2.) One quilt of jute or strong unbleached calico and two woollen quilts.
 - (3.) Three economic crates.
 - (4.) 100 one-pound "D" sections.
 - (5.) Twenty-five $12\frac{3}{4}$ inch separators.
 - (6.) $1\frac{1}{2}$ lbs. brood foundation.
 - (7.) 1 lb. super foundation
 - (8.) One tin petroleum jelly.
 - (9.) One subduing cloth, with stick for same.
 - (10.) One veil and sleevelets.
 - (11.) One feeder.
 - (12.) One wiring apparatus, with wire.
 - (13.) One painter's stripping knife, or cabinet maker's steel scraper, for scraping frames.
 - (14.) One sheet of excluder zinc, 16 inches by 16 inches, or one Wilkes wire excluder.



FIG. 18.—“ABBOTT” SWARM-BOX.



FIG. 19A.

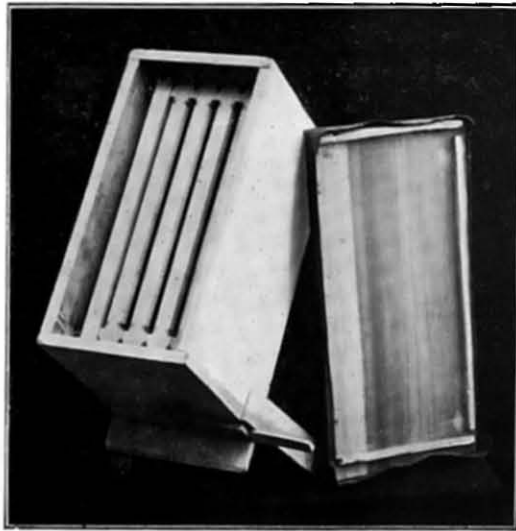


FIG. 19B.

FIGS. 19A, 19B.—TWO VIEWS OF NUCLEUS HIVE OF CHEAP CONSTRUCTION
MADE OUT OF AN OLD BOX.

- (15.) One bottle of Calvert's No. 5 carbolic acid, or other subjugator; one bottle of Izal.
- (16.) One smoker.
- (17.) One super-clearer, fitted with Porter or other bee-escape.
- (18.) One queen cage.

IV. SUBDUING, CONTROLLING, AND HANDLING BEES.

Bee stings are to be avoided not only on account of the pain which they produce, but because if one bee uses its sting, it tends to irritate the others. It is, therefore, manifest that the beekeeper should not only take suitable precautions to avoid being stung, but the bees should also be handled in such a manner as to irritate them as little as possible.

59. Stings.

The beekeeper when manipulating bees should wear a veil (45) and sleevelets (46). A further precaution which may often be advantageously adopted is to draw the socks over the base of the trousers; a hat with a widish brim should be worn, in order to prevent the veil lying against the head; any light-coloured hat is preferable to a black felt hat, which bees appear to dislike.

When manipulating a stock in a hive the frames of which are parallel to the front, as in the "C. D. B." hive, the operator should stand at the back of the hive (Fig. 18): under no conditions should the operator stand in front of the hive, as bees are irritated by meeting an obstacle in their line of flight.

60. Protection from Stings.

61. Position of Operator.

The operator must invariably bear in mind that success in manipulating bees can only be obtained by performing all operations gently and quietly, avoiding any rough or hasty movements tending to irritate the bees or jar the hive. Carelessness in lifting or returning a frame, or removing a section crate, often results in crushing a bee and thereby giving cause for the first sting, which may lead to the irritation of the whole stock. A rapid motion of the hand may also produce the same effect. When bees appear to be irritated and disposed to attack, the operator should remain quite quiet for a moment or two; this will probably pacify them. When handling a frame for examination, it should be held so that the comb will always hang perpendicularly; if the frame is held in such a position that the comb would lie more or less horizontally, the comb, if soft or heavy, would tend to bend or break away from the frame: a suitable and convenient method of handling a frame is indicated by the positions illustrated in Fig. 20. If the frame

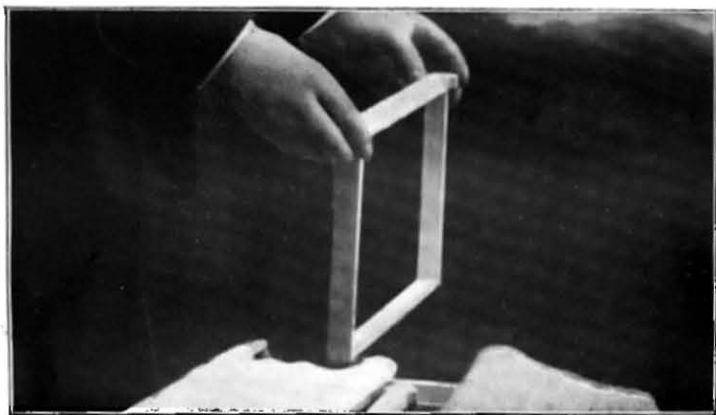
62. Handling Bees.

shoulders have been fixed by propolis, it will be difficult to remove them with the hands without jarring them : in such cases it is a good plan to press the frame gently back by a lever applied between the frames close to the shoulder. If, when holding a frame, or during any other operation, bees creep on to the hands, do not roughly disturb them. When holding frames, keep them as much as is possible over the body-box, so that the queen or any bees when falling may drop into it. When it is desired to remove bees from a frame of comb, this can be done by giving the frame a sharp jerk downwards while holding it over the brood chamber, provided that the comb is fairly tough and rigid, such as comb which has contained brood ; if, however, the comb in the frame is new and soft, or if it contains much thin unripe honey, as would frequently be the case during the honey flow period, the bees should be brushed off the frames with a wing or feather ; soft comb, especially if it is carrying honey, would easily be broken or damaged by a jerk, and it would not be possible to jerk the bees off a comb carrying thin unripe honey, without slinging honey over, into, and about the hive, thereby doing much harm in many ways. A little vaseline rubbed over the fingers will prevent propolis adhering to them, and will lessen the chance of receiving stings. Bees are quieter in the morning than in the afternoon or evening ; the examination of stocks, and most operations, should therefore, so far as possible, be performed in the morning ; certain operations should be performed in the late afternoon or evening ; this will be mentioned when describing such operations.

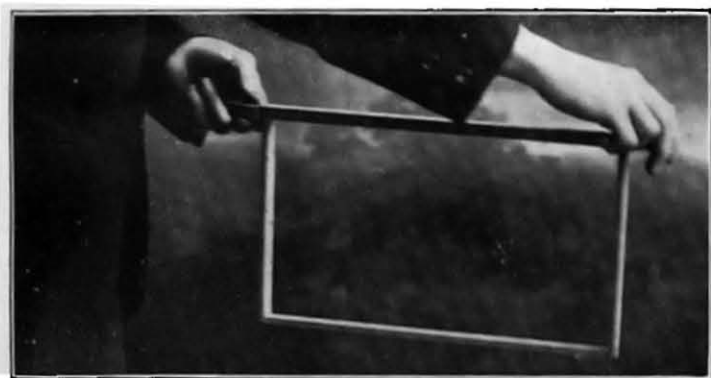
When bees in a hive are frightened, they at once gorge themselves with honey, in which condition they find it difficult and probably painful to use their stings ; hence when gorged, bees will only use their stings under great provocation. Obviously, therefore, a simple method to prevent stinging is to induce the bees to gorge, which can be done by the methods described in the three following paragraphs.

When about to examine a hive, first take one or two long, strong feathers such as goose quills, saturated with subduing solution (180), and push them as far as possible into the hive through the door and under the frames, leaving them thus (Fig. 13) ; then take off the roof and any coverings over the quilt ; it will generally be most convenient to remove the lift also ; then with a feather smear the frame shoulders with subduing solution ; this tends to prevent the bees running out on the shoulders of the frame while it is held by the operator.

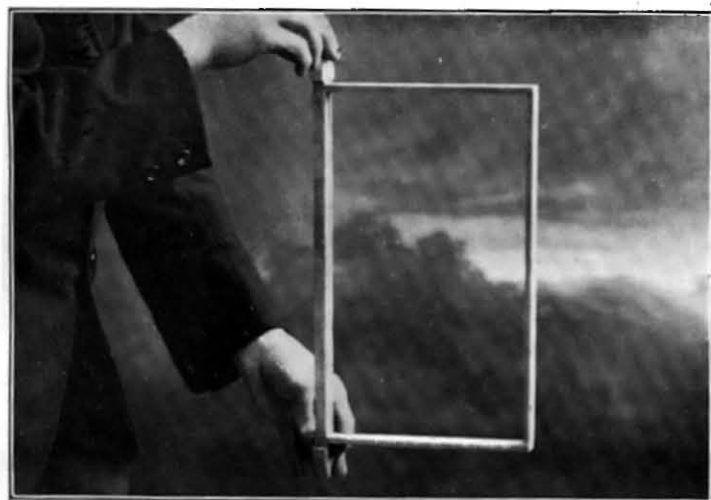
Having inserted the subduing feathers, damp the subduing cloth (43) with subduing solution (180), insert the stick, and then while holding the stick in one hand, with the other take hold of the side edge of the quilt and gently peel it off, and as the upturned



A. First Position.



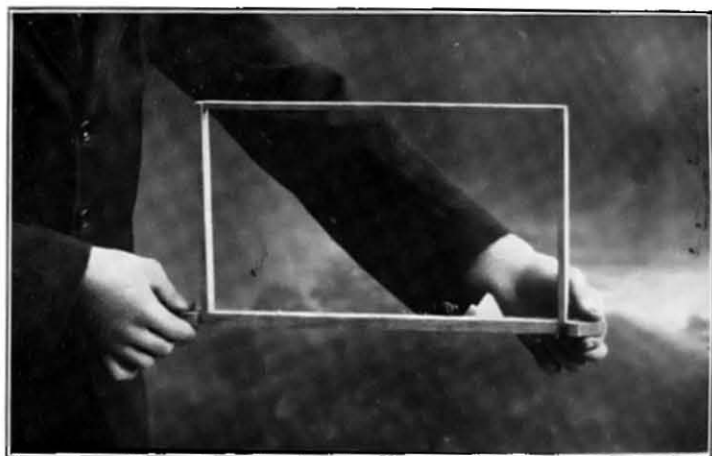
B. Second Position.



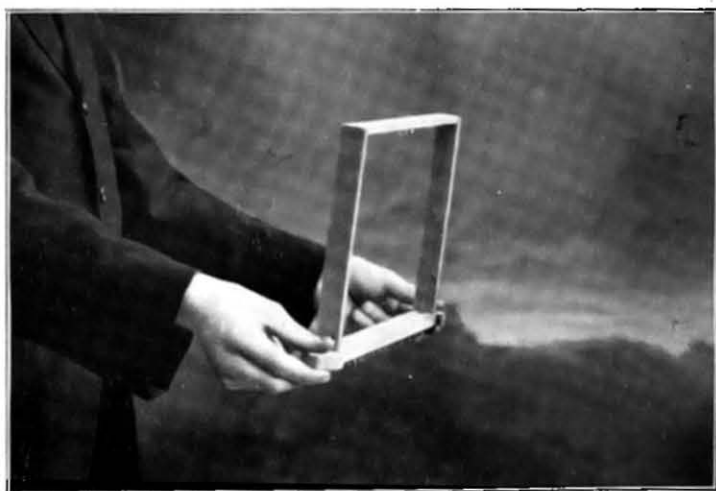
C. Third Position.

FIG. 20.—HOW TO HANDLE A FRAME WHEN TURNING IT.

(Continued on next page.)



D. Fourth Position.



E. Final Position.

FIG. 20 (contd.)—HOW TO HANDLE A FRAME WHEN TURNING IT.

quilt is drawn off exposing the top bars of the frames, draw the subduing cloth after it, so that it shall lie on the frames (Fig. 21). Then lay the quilt on the ground under side up, in front of and partly lying on the alighting board, so that the bees adhering to it may pass into the hive. If it is desired to examine the back frames only, the quilt should be peeled off from back to front, as far as necessary, drawing the subduing cloth over the frames as the quilt is removed. If after a little time the bees show a continued inclination to surge up to the top of the frames, the feathers (64) should be withdrawn from the entrance. The subduing cloth should be allowed to rest on the frames for from one to three minutes according to the special circumstances of the case; if it is left on too long the bees will be driven off the brood combs, and the brood would be liable to be chilled (164). If it is necessary to lift the dummy (25), another subduing cloth should be allowed to hang behind the last frame; this will drive the bees to the front, so that the rear of the body-box (21) will be clear of bees when it is necessary to replace the dummy. If, notwithstanding the above-mentioned treatment, the bees become so unmanageable as to render manipulation difficult, it may be advisable to replace the coverings and postpone operations, taking care to withdraw the subduing cloth and feathers; or the smoker (66) may be used. To replace the quilt, spread the subduing cloth over the frames; then spread the quilt flat on the subduing cloth; next, while holding one side of the quilt with one hand to retain it in its proper position, withdraw the subduing cloth with the other, leaving the quilt on the frames. If, as may often occur when food is scarce, the hive does not contain stores of unsealed food with which the bees can gorge themselves, some syrup should be poured on the combs so that it may trickle down them, the bees will then readily gorge themselves with it; about two tablespoonfuls of syrup is sufficient for a strong stock. A good method of giving syrup for quieting is to spread a piece of butter-muslin across the top bars, and to pour the syrup upon it.

The use of the smoker is not recommended in ordinary practice; so far as possible bees should be subdued
 66. Subduing with by one of the methods already described;
 Smoker. there are, however, occasions on which
 the use of the smoker is recommended in
 the instructions which follow.

Having charged and lighted the smoker (44), insert the nozzle at the hive door, and then blow in three or four puffs of smoke. Then wait for three or four minutes, after which the hive may be uncovered as described above (65). Then turn back the quilt and blow a few puffs of smoke on the tops of the frames as the quilt is withdrawn; the smoker should then be placed at hand, nozzle up, for further use when necessary.

V. ARRANGEMENT OF APIARY.

Unless a stock (5) is procured in a bar-frame hive, the bees

67. Commencing Bee-keeping. must necessarily be provided in one of the following ways:—

- (1.) By obtaining a natural (92) or artificial (XXIII.) swarm.
- (2.) By transfer of a stock from a skep or other fixed comb hive (87).

The necessary appliances mentioned in the list already given (58) should be procured, and a suitable site should be selected for the apiary.

The hives should preferably be placed in an open position, but it is desirable that they should be protected

68. Site of Apiary. from northerly winds: it is essential that the bees should have a clear flight to the front; a high hedge or wall or other obstruction in front of the hives that would impede the outward or homeward flight of the bees is very objectionable. The site should be dry, and grass or other herbage should be kept low immediately about the apiary, which should be protected by a fence from disturbance by live stock, and there should be sufficient clear space behind the hives to permit of manipulating the stocks with facility. It is inadvisable to place hives immediately in front of a south wall, as in such a position the hive temperature is much increased on hot days, and the variation of temperature in the hive between the hottest part of the day and the coldest part of the night is objectionably intensified. When it is intended to have many hives in an apiary they should be at least six feet, and if possible twelve feet or further apart. If it is necessary to place one row of hives in front of another, there should be a space of at least twelve feet between the rows, unless the ground falls so rapidly as to permit the bees from the back row of hives to have a free flight over the front row. Double rows of hives close together should not be adopted except from want of space, as the double row system places difficulties in the way of manipulations. Hives should not be placed in damp or closely-sheltered situations. When there is more than one hive in an apiary, the hives, or at least the front of the hives, should be painted in different colours, so that the bees may readily recognise their own hives. Fig. 22 represents a well arranged cottager's apiary in Donegal.

The hive should stand upon a solid foundation, capable of sustaining it perfectly level when it is fully

69. Hive Stand. loaded with honey. A "C. D. B." hive, carrying five crates of well-filled sections might weigh about $1\frac{1}{2}$ cwt. The best description of stand is one made of concrete; the site should be levelled, the surface soil removed and replaced by broken stones up to the ground level; a layer of concrete should then be put over the stones and finished off so as to give a smooth level surface, measuring



FIG. 21.—SUBDUING CLOTH IN USE.
S, Subduing Cloth. Q, Quilt.



FIG. 22.—COTTAGE APIARY IN DONEGAL.

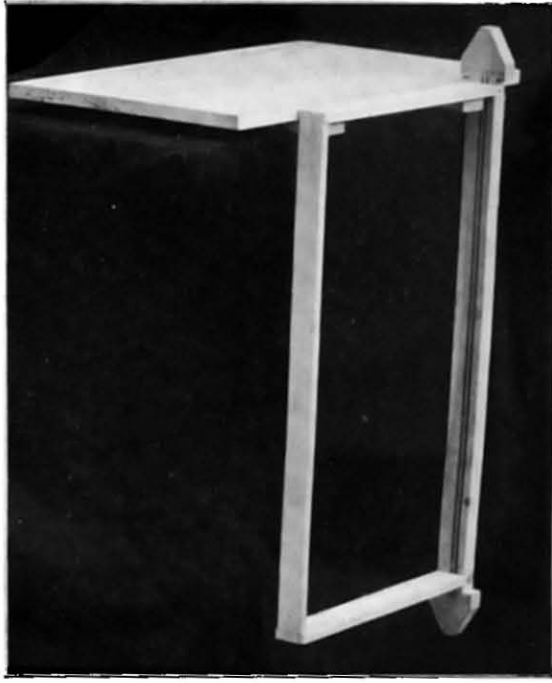


FIG. 23.—FRAME HANGING ON EMBEDDING BOARD
FOR MARKING FOR WIRING.

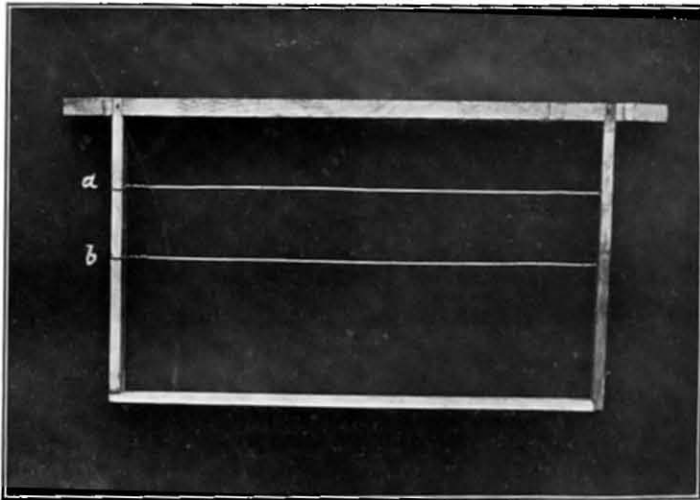


FIG. 24.—WIRED FRAME.
a, *b*, Places where wire is tied to frame.

26 inches by 26 inches, at about three inches above the ground level. It will be found convenient to use a wooden frame four inches deep in which to mould the concrete, which should consist of:—

- 3 parts sharp sand,
- 3 parts fine broken stone,
- 1 part of Portland cement.

Two bent irons should be set in the concrete, one on each side of the hive, to provide means for tying it down in windy weather. If the site is infested by ants, a groove two inches deep and two inches wide should be made in the concrete all round the hive to hold water. The surface of the stand should be made quite level, using a spirit level to ascertain that it is so. If it is desired to have a movable stand, the concrete may be moulded in a box, or a large flagstone may be used. It is a good plan to lay a heavy dressing of cinders for about a yard all round the stand to prevent the growth of herbage.

VI. WIRING FRAMES AND FIXING FOUNDATION IN FRAMES.

Although the upper edge of the foundation is held by the top bar of the frame (24), it is necessary to give it further support to prevent it stretching or breaking down under the weight of bees which it has to support when the brood chamber is at a high temperature; such support is provided by fastening wires across the frames and embedding them in the foundation.

70. Reason for Wiring.

To wire a frame, cut a piece of zinc 6 inches by $\frac{7}{8}$ -inch (G, Fig. 10), or a piece of hard wood of same dimensions and about $\frac{1}{4}$ -inch thick, and in this bore a hole with a fine bradawl at two inches from one end, and another at 4 or $4\frac{1}{2}$ inches from

71. Wiring Frames for Brood Chamber.

the same end, the holes being equidistant from either side: this is to be reserved for use as a gauge. Hold the gauge against one side bar of the frame so that one hole in it shall be 2 inches from the under side of the top bar, and that the edges of the gauge shall be flush with the edges of the side bar; then bore holes for the embedding wire (35) through the two holes in the gauge and through the side bar; bore similar holes in the other side bar; cut off 44 inches of embedding wire and pass it through the two holes nearest to the top bar (a, Fig. 24), draw the wire through, leaving about seven inches of wire outside the frame; fasten it to the second side bar by taking it right round that bar, and back through the hole, then lead it down inside the side bar, out through the lower hole in that bar (b, Fig. 24), then right round the bar and in through the hole to the second hole in the opposite bar; pull each end of the wire tight enough to twang sharply when struck, and then secure each end as shown in Fig. 25. A little experience will enable the operator to do this with-

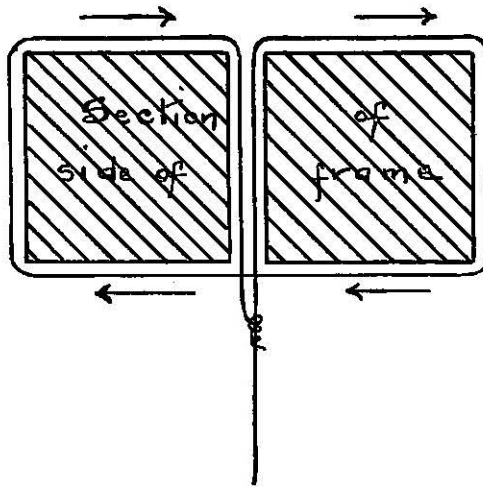


FIG. 25.—METHOD OF FASTENING WIRE.

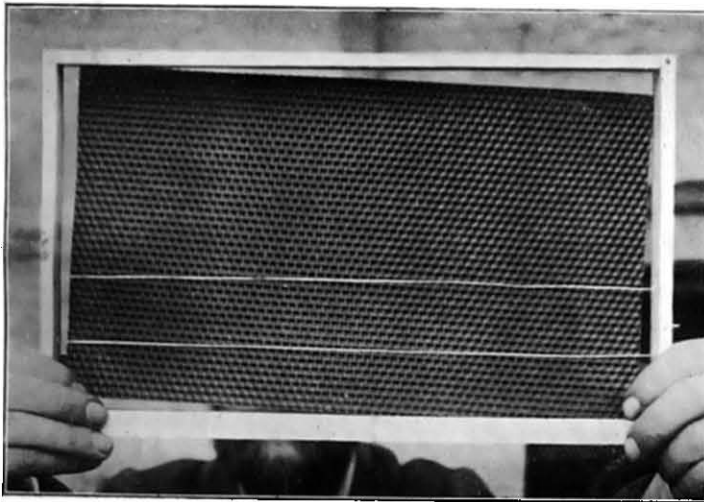


FIG. 26.—PLACING FOUNDATION IN FRAME.

out cutting the wire until all that is required has been taken off the coil.

The following is an alternative method of wiring: Draw a line on the embedding board parallel to and 2 inches from one of its long sides, and another line at 4 or $4\frac{1}{2}$ inches from and parallel to the same side; then write along that edge of the board from which the measurements were taken, "Place top bar at this side, and bore for wires over horizontal lines"; place the embedding board flat side up on a table, allowing one end of the board to project as far as the inner edge of the cross slip: hang the frame by one side on the board, with its top bar next that side which is two inches from the nearest line; bore a hole in the centre of the frame side directly over each line; then bore two holes in exactly similar positions in the opposite side of the frame; the holes will be 2 inches and 4 or $4\frac{1}{2}$ inches respectively from the under side of the top bar. Drive a gimp pin or light tack partially into the centre of each side of the frame, directly over each hole; pass an embedding wire through the two holes nearest to the top bar, and back through the two holes furthest from that bar, grip the wires by hand, and pull them towards one frame side, slip the middle of the wire over the two tacks on the other frame side, tighten the wire and secure it by winding each end round a tack; the wires should be so tight as to twang sharply when struck; then drive the tacks home.

The above described methods of wiring (71) are the best to adopt when stocks are to be worked mainly for

72. Wiring Frames for Extracting. sections, as they provide sufficient support for the comb hanging perpendicularly.

Beekeepers who work largely for extracting frequently prefer to wire the frames as shown by X, Fig. 10; this system interferes with the brood nest more than does the parallel wire system (71), but it supports the comb better during the process of extracting.

To fix the foundation in the frame after the latter has been wired, hold the frame inverted perpendicu-

73. Fixing Foundation in Frame. larly, gripping it by one hand at the shoulder, then take a sheet of frame foundation (33) in the other hand, and insert

one corner of it at that end of the centre groove on the top bar which is next the hand holding the frame, steadying the foundation with the thumb and fingers of that hand; then, with both hands work the foundation into the centre groove (Fig. 26), and draw it gently from side to side to work it down into its proper position in the bottom of the groove; next hold the frame still in inverted position in one hand, the arm being extended downwards and the frame so held that the foundation is supported by the wires (Fig. 27), then holding the wedged slip in a slanting position as indicated by Fig. 27, run the end of the wedge right along the groove, so as to press the mid-rib against

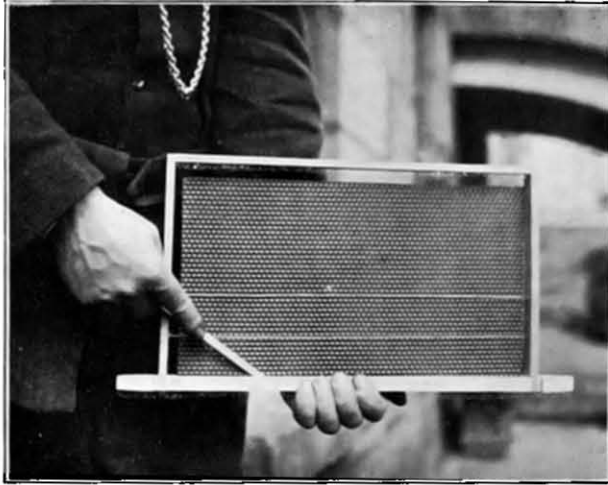


FIG. 27.—WEDGING FOUNDATION IN FRAME.

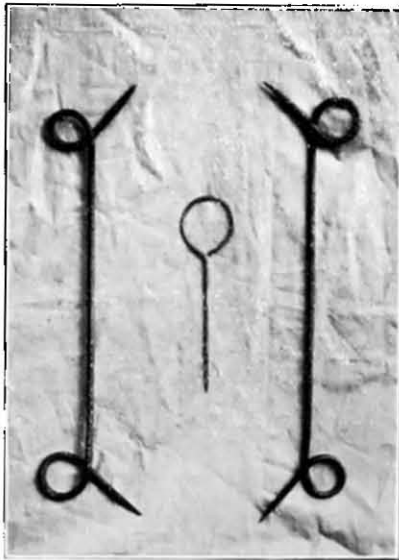


FIG. 28.—DRIVING IRONS.

the foundation and open the groove for the wedge, after which press the wedge tightly home in its groove, thus firmly fixing the foundation. If the foundation has erroneously been fixed in the outer instead of in the centre groove, it should be taken out and correctly inserted, otherwise the comb will be useless.

To embed the wires in the frame in the foundation, lay the frame

**74. Embedding
Foundation.**

in which the foundation has been fixed on the embedding-board (36) with the wires above the sheet of foundation. Take care that every part of the foundation is resting on the board and that the wire rests evenly along the surface of the foundation. Now take the embedder (37) and heat it in a fire, then run it lightly along the wire with an even pressure, so as to sink the wire into but not through the foundation; the embedder should be just hot enough to melt the wax sufficiently to cause it to flow over and cover the wire.

VII. HIVING.

To prepare a hive for receiving a swarm, place the floor board (20) in correct position on the stand. With a spirit level ascertain if the floor-board is level; if a spirit level is not available, a bowl of water may be used as a rough substitute. If the floor-board is not level and steady, it should be made so by wedging up the legs where necessary with pieces of zinc, iron, slate, or other suitable material. Place the body-box (21) on the floor-board, taking care that it fits closely thereto, leaving no space between the floor-board and the back or side walls of the body-box; when thus correctly placed the spirit level should indicate that the body-box is level. Smear with petroleum jelly or vaseline the upper chamfered edges of the inner side walls of the body-box on which the frames will rest, and the under sides and meeting points of the shoulders of the frames which are to be inserted in the hive; these frames should have been previously filled with foundation (73), unless frames filled with good empty drawn-out worker comb are available. One frame should be provided for each pound in weight of the swarm, allowing an extra frame if the weight of bees exceeds any given number of pounds by half a pound or more. Place these frames in the front part of the body-box, behind them place the dummy (25), the sides of which should first be smeared with petroleum jelly so that it may slide along the body-box walls when pushed back or forward; if a frame containing honey is available, it should be inserted next to and in front of the dummy; then push the dummy and frames tightly up against the front of the hive. It is important to remember that when the hive is closed, the shoulders of the frames in the brood chamber should always be in close contact, those of the front frame being in contact with the hive front; any propolis or dirt which prevents the frame

shoulders being in contact should be removed; spaces left between the frame shoulders permit the escape of heat or possibly of bees, and they also permit of the comb being drawn out beyond the proper limit, which may lead to the destruction of bees, possibly of a queen, when the frames are pressed together. The remaining frames of the hive may now be placed in the body-box behind the dummy (Fig. 31). Then spread the canvas quilt (26) over the frames, covering them so that no bees can escape. If the quilt is wrinkled and does not lie flat, it should be damped and flattened out. Over the quilt place a couple of woollen or other coverings. The lift (22) should now be placed on the body-box in its summer position, that is, resting on the body-box; in its winter position it is inverted, and slips down outside the body-box; the roof (23) should then be placed on the lift, with the cone bee-escape (42) to the front. The hive is now ready for the swarm.

In warm weather in which swarms usually rise, it is best to defer hiving the swarm until the heat of the day has passed, but on a cool day the bees may be hived at any hour. The treatment of swarms is referred to later (93).

**76. Hiving a Swarm
through Hive
Entrance.**

There are two methods of hiving a swarm; the best and proper method to follow, when circumstances permit, is to hive the bees through the hive entrance; but special conditions, such as coming rain or approaching darkness, may render it desirable to adopt the speedier method of throwing the swarm into the brood chamber through the frames (80). To hive the swarm through the entrance (Fig. 29), place the hiving-board (54) in position against the alighting board (20), and spread a white sheet on the hiving-board, placing stones on the edges of the sheet to prevent the wind from blowing it about and to keep it in position. Open the sliding doors of the hive to their fullest extent; also open the floor ventilator if one is fitted. Now bring the skep or box containing the swarm to the new hive. If the afternoon is hot and close, it is a good plan after uncovering the bees to sprinkle them lightly with cold water to prevent their rising; then catching the swarm-box or skep firmly with both hands, jerk all or part of the bees out, depositing them on the sheet in a continuous stream from about six inches from the hive entrance to the extreme lower end of the hiving-board. This will prevent the bees unduly crowding at the entrance, and will permit of observing the queen's movements. Now turn back the veil so as to facilitate finding the queen; it is important to discover the queen as quickly as possible, and not to lose sight of her until she is observed entering the hive. If the bees do not show an inclination to enter the hive, they may be urged on with a feather; it will soon be noticed that they will turn almost simultaneously towards the entrance, through which they will move in a continuous stream. If, however, the bees still show a disinclination to enter the hive, a sharp



FIG. 29.—HIVING SWARM THROUGH HIVE ENTRANCE.



FIG. 20.—DRIVING BEES FROM A SKEP.

tapping on the hiving-board will make them do so. Some operators wedge up the body-box so as to afford a freer entrance to the bees, but this should not be done, as there is a risk of crushing the queen when afterwards lowering the body-box. When all the bees have entered the hive, the operation has been completed.

For signs of queenlessness see par. 145. If the queen has been lost in hiving a swarm, the swarm will

77. Queen lost when Hiving. immediately return to its own hive, if the hive is in the neighbourhood; if, however, the swarm has been brought from a place more than two miles distant, if possible introduce a queen (153), or a frame bearing a queen cell containing a young queen, or carrying eggs or young larvæ.

On the day after hiving a swarm, or as soon after that as possible, ascertain if any foundation

78. Examination of Hive after Hiving a Swarm. has broken down in the hive; for instructions as to opening and examining hive see Section IV. Having subdued the bees,

draw back the dummy so as to afford space to permit of the frames being drawn back and examined one by one. If the foundation or comb of any frame has broken down, hold the frame over the body-box, and with a sharp jerk, shake, or with a feather, brush the bees off it into the hive; then insert a fresh frame of foundation in place of the frame withdrawn.

The length of time which should elapse before inserting a frame to spread the brood chamber (90) after

79. Treatment of Stock after Hiving a Swarm. hiving a swarm will vary very much according to circumstances, but as it is a bad practice to open hives oftener than is

necessary for examination, it may be stated, as affording some guidance to the beginner, that if a swarm of about four pounds weight has been hived on say four frames, and that the weather continues favourable and the honey flow is good, the hive should be examined on the eighth day after hiving to ascertain if another frame is required. For instructions as to inserting a frame, see "Brood-spreading" (90). If after hiving a a swarm the weather is unfavourable for gathering honey, it may be necessary to feed the bees (103); after brood-spreading, it will be necessary to attend to supering (XIII).

As already stated, it will sometimes occur that owing to threatening rain, limited daylight, or other

80. Hiving a Swarm by Casting Bees into Brood-chamber. circumstances, it is desirable that hiving should be performed rapidly; in such cases prepare the hive for receiving a

swarm (75), remove the roof but not the lift, damp the tops of the shoulders of the frames and dummy and the channel beneath with subduing solution (180), to deter the bees from crawling out over them, draw the dummy to the back of the body-box and spread the frames,

leaving the central frames about two inches apart. Next, if necessary, sprinkle the bees lightly with water (76), then while firmly holding the skep or swarm-box with the open side up, shake it so as to detach the bees from the sides, and then rapidly reversing it, throw the bees down so that they may fall between the frames into the body-box. Then leaving the frames spread out, cover them at once with the quilt and replace the roof. The bees will rapidly go down amongst the frames, after which the dummy and frames should be pressed to the front and covered. Next morning examine the hive and remove any frame the foundation of which has fallen, replacing it by a new frame of foundation (90); afterwards treat the stock as already described in the case of a swarm hived through the entrance (76).

VIII. DRIVING.

Driving is practised to remove bees from skeps or boxes having fixed combs, either for the purpose of transferring the bees to a bar-frame hive, or in order to make an artificial swarm; if the bees are in a skep, have in readiness a chair, an empty skep to receive the driven bees, two driving-irons, a skewer, a subduing cloth (43), a feather dipped in subduing solution (180), and if the stock is in a round-topped skep, a bucket or large pot of such size that the skep when inverted may rest in it with at least half the skep exposed above the rim of the bucket or pot. Driving irons (Fig. 28) are made of No. 4 wire or light iron, about 12 inches long and with $1\frac{1}{2}$ inches at each end turned at an angle and pointed.

Driving should be performed in the forenoon, as bees move more sluggishly in the afternoon. It will be assumed that the stock to be driven is in a skep. If the weather is moderately cool, and the honey flow is slight, spread a subduing cloth (43) flat under the skep, then lower the skep down on the cloth, placing a small stone or bit of wood under the front rim so as to keep that rim about one inch above the subduing cloth. The fumes rising from the subduing cloth will cause the bees to gorge (63) and drive them upwards. Then place the bucket a few yards from the skep. After three minutes remove the stone, let the skep down on the subduing cloth, and then lift and invert the skep, taking care that its mouth is entirely covered by the cloth, thus confining the bees therein; if the weather is hot, or the honey flow is good, the skep to be driven should be at once inverted after placing it on the subduing cloth; then place the inverted skep in the bucket and fix an empty skep into position on the stock hive, as indicated by Fig. 30, using the skewer to pin the skeps together where their rims meet, and the driving irons to hold the empty skep at the proper angle; the skeps should be skewered together at that point on the rim of the inverted skep towards which the

81. Driving Appliances.

82. Open Driving from a Skep.

combs run, and should be so placed that the operator when driving shall have his back to the strongest light. Next, remove the subduing cloth, and rap the lower hive with the hands so as to jar the combs without detaching them; in very hot weather rap lightly; the bees will soon run up into the empty skep, a careful watch should then be kept for the queen, as it is important that the operator should be aware whether she has or has not passed into the upper skep. An empty skep or box to receive flying bees should be left on the stand from which the skep to be driven has been removed. When all the bees, or as many as are required, have been driven, the driving irons may be removed, and the new hive with the driven lot may be covered over for removal, or if it is desired to catch the flying bees in it, it should be placed on the old skep stand; the hive from which the bees were driven should be replaced on its stand if it is intended that the flying bees shall return to it; whereas if all bees have been driven from it in order that the honey comb may be removed, it should be covered and put away so that no bees can get at it.

In cold or wet weather, or late in the evening, driven bees are slow to go up into the new hive; in such

83. Close Driving. circumstances it is best to place the new skep or hive directly on the top of the old one, and to fix it there with skewers so that the bees will not be able to escape; proceed then as in open driving[†] (82) This is called "close driving." The drawback to this method is that the queen's movements cannot be observed.

If the stock which is to be transferred is in a wooden box, the same procedure should be adopted, except

84. Driving Bees from a Box. that a light box may be used in preference to a skep for driving the bees into. This receiving-box should be fixed in position over the inverted box hive and held there by two nails; to avoid disturbing the bees before driving is commenced, the nails should be driven through the rim of the upper box before it is placed in position, and holes to receive them should be bored in the rim of the lower box, after which the nails should be driven home. If necessary, the upper box may be further supported by one or two laths tacked to the side of each box.

IX. TRANSFERRING BEES FROM A FIXED-COMB HIVE TO A BAR-FRAME HIVE.

A method of transferring which is often adopted, that of cutting out the combs, fixing them in frames with

85. Transferring Comb and Bees from Fixed-Comb Hive to Bar-frame Hive. tape and wire, and transferring bees and comb thus to a bar-frame hive is not recommended. It is very troublesome to carry out, is likely to cause much loss of brood, and is almost certain to result in

having a lot of frames with old and misshapen comb that should be discarded.

The best time to transfer a stock from a fixed-comb hive is when the stock is so strong that the combs are crowded with bees, and the brood almost

86. Preparing a stock for transfer from a Fixed-Comb Hive to a Bar-frame Hive. extends to the bottom of the combs; the sooner the transfer is effected after that period, the better; the earlier the transfer is effected the better; therefore the stock

that is to be transferred should be pushed forward by stimulative feeding (106), if it appears to be advisable to do so. To stimulate the stock in the fixed-comb hive, a feeder should be fixed on the top of the box or skep containing it, in which a hole must be cut for this purpose; the feeder should be secured in position by wires or nails, and protected from the weather by a covering-box or skep.

Prepare a stand (69) for the bar-frame hive. If the new hive is to be placed on the site of the old one, a

87. Transferring Bees from a Fixed-Comb Hive to a Bar-frame Hive. good plan to follow is to move the old stock two yards straight to the front of its old position, and then to provide a stand for the new hive on the site of the old one. If it is desired to place the new hive at some

distance from the site of the old one, the removal of the old one should be carried out some time in advance as described in paragraph 182. Prepare the bar-frame hive as for receiving a swarm (75), giving from six to eight frames, in accordance with the strength of the stock to be transferred; if some only, but not all, the frames required can be supplied filled with empty comb, place the frames containing foundation in the centre; push all frames to the front with the dummy, and in the space behind the dummy place empty frames, or cover the space with an extension board (95), the top of which should lie flush with the tops of the bar frames. Fit a quilt of linoleum, American cloth, or oil cloth, over the frames, and cut in it a hole 6 to 8 inches square, or about seven inches in diameter, in such position that the hole shall be in front of the dummy and over the centre of the frames when the quilt is on them. Place the skep or box containing the stock to be transferred, over the hole in the quilt (Fig. 83) put on the lift, and pack well all round, to maintain warmth and prevent bees getting out under the edges of the fixed comb hive, and close the doors to 1½ inches apart. Leave the feeder in position as before (86) and attend to feeding, as it is necessary to stimulate breeding (106). About seven to fourteen days after transferring, turn up the quilt at the front corners to ascertain if the bees have descended to the bar frames; if they have, and if breeding has commenced below, remove the skep, and examine the frames for eggs or larvæ; also ascertain if the queen is on the frames; if she is not, drive the skep (82) in order to find her, secure the quilt in its former position, place a sheet of queen excluder to cover the hole in it (Fig. 82) and return the skep or box, packing



FIG. 31.—BODY BOX WITH FRAMES ARRANGED FOR TRANSFERRING, OR FOR HIVING A SWARM.

A, Empty frames. B, Frames containing drawn out comb or foundation.
H, Frame of honey. D, Dummy.



FIG. 32.—BODY BOX, WITH EXCLUDER ZINC AND COVER IN POSITION. FOR TRANSFERRING

Z, Excluder zinc. C, Cover of American cloth, linoleum, or cardboard.



FIG. 33.—BODY-BOX, WITH SHEAF IN POSITION FOR TRANSFERRING.

Note.—Feeder is not shown in position.



FIG. 34.—BODY-BOX WITH QUILT ARRANGED FOR FEEDING.

Q, Quilt. H, Feeding hole in quilt. F, Graduated feeder showing holes in metal cap on base, and the marker on same. S, Feeding stage showing curved slot: when in position for feeding, the centre of the stage should be over the hole "H."

it securely round the edges as before, but making in it a small exit by which drones may escape to the roof, which should be lifted now and then to permit them to escape; then hive the driven bees with the queen at the entrance (76). On no account must the queen be confined to the combs in the bar-frames, unless eggs have been laid in those combs; otherwise queens will probably be hatched in the upper or fixed-comb hive. In from seven to fourteen days after confining the queen to the bar-frames, if the conditions have been favourable for breeding, weather fine, and honey coming in, it will be advisable to add a frame of foundation, see "brood spreading" (90). On the twenty-second day after placing on the excluder, all worker brood will be hatched out in the skep, which may then be removed; the bees should be driven from it and hived in the bar-frame hive, after which treat the stock in the ordinary way; or the skep may be left in position, in order that the bees may fill the empty combs with honey; the excluder zinc being of course left on.

X. BROOD-SPREADING.

Brood-spreading signifies artificially assisting the expansion of the area occupied by the brood nest, by placing

88. Reasons for Brood-spreading. a frame of foundation or empty comb in the centre of the brood chamber for the queen to lay in, or by transferring to the

same place a frame carrying little brood. By providing empty cells in the centre of the brood chamber, the queen is induced to lay more rapidly than she otherwise would; it also lessens the tendency to swarm, by providing space for the queen to lay in when there are few vacant cells available for that purpose. In the early spring, the brood nest in a bar-frame hive occupies a somewhat circular space about the centre of the middle frames in the body-box; the area thus occupied is gradually extended as the season advances, provided that the conditions for breeding are favourable. The area of comb occupied by brood in each frame diminishes the further the frame is from the centre of the brood nest; in a strong, well-managed hive, brood would in early summer occupy part of the eight or nine central frames, whereas a weak stock might have brood in only three or four frames, because the queen will limit the number of eggs laid in accordance with the capacity of the stock to provide nurses. At times every frame in a strong stock may be more or less occupied by brood.

Brood-spreading should not be practised unless there is a sufficient supply of food, nor in chilly,

89. Time for Brood-spreading. inclement weather. If necessary, artificial feeding (103) should be resorted to,

otherwise brood-spreading will cause more harm than good. It is most important that the stocks should be brought up to full strength by early feeding (106) and brood-spreading before the honey flow commences locally; in such

cases brood-spreading carried on with care, and accompanied by judicious feeding, may advantageously be practised, provided that plenty of covering is provided to assist bees to keep up the temperature of the brood nest, which must then be maintained at a much higher temperature than would suffice in winter. It is also necessary to practise brood-spreading when it is desired to strengthen a stock which has been hived from a swarm (76), or transferred from a skep (87). To ascertain when brood-spreading is desirable, gently turn up the back of the quilt so as to expose the top bars of the dummy and back frame to view; if the space between them is crowded with bees, brood-spreading is necessary.

If in the early breeding season it is desired to encourage brood-raising in order to strengthen the stock, the best course will usually be to transfer a frame carrying little brood from the outside to the centre of the brood chamber;

90. Method of Brood-spreading.

if, however, an examination of the stock, made by merely turning up the back of the quilt without subduing (63) in any way, indicates that the bees are crowded between the back frame and the dummy, a frame of foundation may be inserted in the centre of the brood-nest, instead of transferring a frame of brood. To do this, first subdue (63) without using subduing feathers, draw back the dummy and all frames behind the centre of the brood-nest, so as to permit of transferring or inserting a frame as may have been decided on. If a frame of foundation is to be inserted, mark the date on the shoulder of the top bar, smear the shoulders with petroleum jelly (75), and place it gently in position, without striking the combs on the adjoining frames; then press the dummy and frames tightly to the front, and replace the covers. When spreading brood frames do not place two frames of foundation in the brood nest at one operation. In ordinary conditions during summer, from seven to ten days may be allowed to pass before examining the hive again for brood-spreading; when the bees are crowded between the back frame and dummy, a frame of foundation should be given until the hive contains the desired number of frames. It is, perhaps, well to repeat here the caution already given, that all unnecessary examination of brood frames is objectionable, and that the bee-keeper should therefore endeavour to combine the operation of brood-spreading with any other operation which may necessitate the opening of the hive. When the hive contains the desired number of frames, the introduction of more frames of foundation may be continued, if there is necessity to do so for the purpose of replacing old or badly-shaped comb, or to get rid of frames containing an undue amount of drone cells. If any frames are found to contain an excess of drone comb, they should be removed, unless they contain worker brood, in which case the frames should be placed next the dummy, to be removed when the brood has been hatched out. Subject to these conditions brood

spreading should be discontinued when section crates are on (110).

XI. NATURAL SWARMING.

Natural swarming and its cause has been shortly referred to (11). The subject will now be dealt with

91. Natural Swarming. in its relation to profitable bee-keeping.

Except when the bee-keeper desires to increase his stocks or to provide swarms for sale, swarming should be prevented as far as possible. The beginner will, as a rule, desire to increase his stocks moderately, and therefore will not object to having a few swarms; but when the production of honey is the main object in view, swarming must, so far as possible, be kept down.

Amongst the signs that swarming may shortly be expected are the following:—Bees ceasing to bring in pollen, and clustering listlessly about the hive entrance while other stocks are at work; a marked increase in the number of

92. Signs of Swarming.

drones on the wing on the morning of or a few hours before swarming, these drones dashing about excitedly, making a loud noise; and the building of new queen cells, usually on the edges of combs. The earliest date at which swarming will probably take place may be estimated pretty closely by noting the age of the brood in the most advanced queen cell (10). Top or first swarms usually issue in the forenoon of a fine day, but may issue at an earlier or later hour. The old fertilised queen goes with the top swarm; if she fails to issue with or remain with the swarm, it will return to the hive. The swarm when it issues will probably settle on some bush or branch adjacent to the hive; immediate steps should then be taken to secure it for the reason already given (11).

When the swarm is settling down, or immediately afterwards, it should be sprinkled with cold water by

93. Securing a Swarm. means of a sprayer, syringe, or wisp, to cool the bees, so that they shall have no tendency

to rise. The next thing is to get the swarm safely into a straw skep, or a light box. If the position of the swarm is such that the skep can be held underneath it to receive the bees when jerked into it by giving a sharp upward movement to the branch or other object to which the swarm adheres, this is a good and simple method to adopt. It may be, however, that the swarm is so placed that this method of securing it could not well be carried out, in which case the skep should be fixed in position immediately over the swarm, and as close as possible to it; if the bees have only just settled, they will probably ascend into it; if they do not, they may be induced to do so by placing a cloth saturated with subduing solution (180) under them. When by either method the swarm has been secured, the skep should be taken down, and its mouth should be covered with

butter muslin or similar material, so as to confine the bees while giving them plenty of air; it may then be left in a cool shady place until required for hiving (76), placing it on its side, or mouth downwards but tilted, so as to permit of ample ventilation. If the swarm is not confined, the bees might abscond, and either move to a distant spot selected by the scouts, or possibly return to the hive. The flying bees will not be lost, as they will return to the parent hive. Assuming that it is not intended to dispose of the swarm, a hive should at once be prepared for hiving it (95).

To identify the hive from which a swarm has issued, place a teaspoonful of flour in a large cup, scoop into it from the swarm about a wineglassful of bees, shake them up with the flour, throw them up in the air at about ten yards from the hives, and then watch the hive entrances to ascertain which hive the floured bees will enter.

**94. Identifying
Hive from which
Swarm issued.**

The parent stock and swarm should be treated as follows:—

**95. Treatment of
Parent Stock and
Swarm.**

Remove the hive from which the swarm issued to a temporary position about a yard from its original stand; then place an empty hive on the stand thus vacated, and prepare this hive as for receiving a swarm (75), except that only one frame of foundation is required. Then open the parent hive, and take from it the two frames which contain most capped brood, brush the bees off them, and place them in the new hive; then transfer the front frame, probably containing pollen, from the parent hive to the front of the new hive, and if the parent stock is a strong one of ten or eleven frames, remove also the back frame from the parent hive to the back of the new hive; any queen cells on these frames should be removed; then arrange these frames in the new hive in the following order:—

- (1.) Front or pollen frame.
- (2.) Capped brood frame.
- (3.) Foundation frame.
- (4.) Capped brood frame.
- (5.) Frame of honey (if parent hive is strong.)

The dummy should now be inserted, and all the frames should be pushed forward into their correct positions (75). Then place an extension board sixteen and one-half inches long by four inches wide by half-an-inch thick, behind the dummy, resting it on the sides of the body-box; this board is thus placed to prevent the bees passing down behind the dummy from a crate of sections; the top of this board should be flush with the top of the dummy. Next place a new crate of sections on the hive (110), and over it place any crates that may have been on the parent stock, without removing the bees from them. Then cover and roof. Next place the parent stock on a new stand at some distance from its old stand, after which hive the swarm (76) in the new hive. This is the best procedure to adopt with

the first swarm when it is desired to get as much honey as possible and no serious objection exists to forming a new stock. Firstly, it is the best known preventive of after swarms or "casts" (100) as all the bees which issue from the parent hive on the day after swarming will return to the new hive, leaving the parent stock too weak in bees to allow casts to issue from it. Secondly, the bees in the new hive, having very little brood to feed, can for the next fourteen days devote themselves almost entirely to honey collecting. On the following day all queen cells (9) except the two best should be removed from the combs of the parent hive, if possible leaving two good cells of different ages, one capped, the other uncapped; or a mated queen, if one is available, may be introduced (153), in which case the queen cells should be removed.

If the bee-keeper does not wish to increase the number of stocks in the apiary, or has not a spare hive, the following modification of the procedure just described (95) should be adopted. It will be assumed that there are at least two or three bar-frame stocks in the apiary.

96. Alternative treatment of Stock and Swarm to avoid Increase of Stocks.

Secure the swarm as already described (93). Then transfer all the frames in the parent hive into a suitable box in which they can be suspended and covered, keeping them in the order in which they hung in the old hive, and leaving a small aperture to serve as a door; this box should be placed close to the old hive so that flying bees may enter it. Then clean out the hive from which the frames have been removed, prepare it to receive the swarm and frames (75), and replace it on its stand. Now return to the old hive the front and back frames, replacing them in their original positions; then select the four frames having most capped brood and replace them in the parent hive, destroy all queen cells on frames thus returned, and also place one frame of foundation in the centre of the brood frames: the frames in the parent hive will accordingly be hung in the following order, viz. :—

- (1.) Front or pollen frame.
- (2 & 3.) Two frames of capped brood.
- (4.) One frame of foundation.
- (5 & 6.) Two frames of capped brood.
- (7.) One frame of honey (back frame).

Next insert the dummy, press all frames forward into position, fit an extension board (95) behind the dummy and place super crates, as above explained (95); then brush all adhering bees off the frames remaining in the box, remove all queen cells from them, and distribute those which contain eggs or brood amongst the other hives in the apiary, if necessary withdrawing from such hives frames which contain honey or pollen only, so as to make room. The frames without brood should then be stored away for later use, placing them hanging as in a hive, in a dry place to which wasps and bees have not access.

If for any reason the procedure recommended in paragraph 96 cannot be adopted, and yet that it is desired not to increase the number of stocks, the swarm should be hived in a box or skep and kept therein in a cool place until evening, when it should be returned to the parent stock, as when hiving a swarm. Before returning the swarm, examine the parent stock and remove all queen cells; if desired remove completed crates; then put a frame of foundation in the centre, if necessary removing a front or back frame to provide room. If a hive is being worked for extracting, transfer to the super-box of the extracting hive as many frames of brood as may be removed in accordance with the instructions given in paragraph 98.

If, as is improbable, the swarm issued from a hive which had been supered with frames for extracting, or from one which had not been supered, but which it is intended to work for extracting, the procedure would be slightly different; still assuming that it is not desired to increase the stocks, first, in the case of a hive supered for extracting, instead of transferring the frames from the parent hive to a box as directed in paragraph 96, remove from the super-box as many frames as are fit for removal for extracting, extract them, and in their place transfer from the brood chamber to the super-box as many of the most advanced brood frames, not exceeding six, as there is room for in the super-box, removing all queen cells from them. Next examine the remaining frames in the brood chamber and remove all queen cells; then place three or four frames of foundation in the brood chamber, alternating them with the frames left therein; fit an extension board (95) behind the dummy to fill the space under the doubling box left vacant by the removal of frames; replace the super, and then return the swarm to the parent hive by the entrance (76).

If the hive which swarmed had not been supered, but is to be worked for extracting, and has been so far properly treated, and is therefore fit for supering, hive the swarm in a box (97), then act according to the instructions given in paragraph 120, and then return the swarm to the hive by the entrance (76).

Casts are swarms which issue after the first swarm (12). If honey production is the first consideration, they should be suppressed as much as possible by adopting the treatment recommended in paragraphs 13, 95, 96; but if the object is to produce swarms for sale, the first or even subsequent casts may be taken by experienced bee-keepers

who would have the knowledge requisite to enable them to deal properly with both the cast and the parent stock under varying conditions; it is advised that the inexperienced bee-keeper should return a cast to the parent stock (97).

XII. FEEDING.

Feeding is necessary from time to time throughout the year for the following reasons:—

101. Reasons for Feeding. *In Summer*:—(a.) When, owing to unfavourable weather the inflow of honey is so precarious that unless food is supplied, breeding will be slackened or cease, or brood may be cast out. (b.) To assist swarms to develop when the honey flow is insufficient. (c.) To assist a stock during or after transfer from a fixed comb hive (87).

In Autumn:—(a.) To stimulate breeding. (b.) To bring the winter food supply up to the proper weight.

In Spring:—To stimulate breeding, and to preserve the lives of bees when their stores are running short.

The feeder (38) is used as follows:—Cut a hole in the quilt of a size to suit the feeder to be used; the centre of the hole to be about six inches from the front edge of the quilt and midway between its sides, leaving a section uncut so that the flap may be turned back for feeding and afterwards replaced (Fig. 84). Place the feeder or feeding stage over the opened hole in the quilt, and pour into the feeder the desired amount of syrup. Then cover the feeder and brood nest amply with warm coverings, taking care when packing not to push the feeder out of position. At all times when feeding is practised, the food should be given in the evening after the bees have stopped flying; this is necessary as a precaution against inciting to robbing (141).

If the weather is warm and the honey flow good after a swarm has been hived (76), the bees should be able to provide for themselves; but if the weather is wet or cold, or if the bees are bringing in little honey, the swarm should be fed with one quart of summer syrup (178) by quick feeding (40), after which slow feeding (38) may be given if necessary. It is to be noted that no harm can at any time accrue by feeding a swarm until supers can be put on (108), provided that the feeding is limited to what is necessary, but very serious harm may ensue if the swarm is left without food when food is wanted. Breeding should be encouraged in the case of a newly-hived swarm, and it will cease if the food supply falls too low. Dead brood lying at the hive entrance is an almost certain indication that the stock is starving; sometimes, but rarely, it is the result of robbing.

It is generally considered by beekeepers that stocks may be

safely left to take care of themselves as to food supply during the summer, but they frequently suffer severely from want of food during that period. Honey is often very scarce during the period after the early tree blossoms have gone and before white clover is in full bloom, and again when the white clover bloom is over and before ling-heather is in bloom; stocks may dwindle so much during these intervals as to be unable to recover strength in time to make use of the succeeding honey flow. The necessity for feeding at such periods is therefore obvious. At such times supers not containing honey should be removed, unless the stock is so strong as to require one for extra space. If there is honey available in sections, it may be fed as described below, but it is best not to leave more than one crate on under such conditions; if the stock's food supply is low, and comb honey is not available for food, feeding as necessary with summer syrup (178) should be adopted. If the stock is on the verge of starvation when noticed, give one quart of summer syrup rapidly. If, however, it is only necessary to keep a strong stock in good breeding condition, so that it will be capable of taking full advantage of the return of the honey flow, give about $\frac{1}{2}$ to $\frac{1}{4}$ pint of summer syrup daily. The honey in uncompleted sections may advantageously be fed to bees. If there are only a few such sections they should be placed behind the dummy, in the lower edge of which a passage $\frac{1}{8}$ in. to $\frac{3}{8}$ in. deep should be cut for the workers to pass through. A good method for providing such a passage, is to cut a piece 2 in. wide by $\frac{3}{8}$ in. deep out of the base of the dummy, and to fix it in its place again by a fine screw or nail driven through its centre up into the dummy; its ends may be slightly bevelled: this piece of wood may be turned as desired to open or close the passage from the brood chamber to the rear of the dummy; if there are many sections they may be left in a crate on the hive, turning back the fore end of the quilt to let the bees come up between the two front frames. The unripe honey taken from the ripener (124) may advantageously be used for summer feeding, either by itself, or mixed with summer syrup. If a stock is found to be without food, a good method of affording immediate relief is to take out a back frame containing a large number of empty cells, lay it down flat on one of its sides and pour summer syrup slowly over the face of the comb, so that it shall flow into the empty cells on the upper side of the comb; then return the frame, placing it at the back of the brood nest.

When it is desired to stimulate breeding in order to bring a stock up to the full strength for wintering,
 104. Autumn Feeding, it should be fed with two holes, but not more, of summer syrup (38, 178). In order that a stock may winter safely, it should be provided with at least twenty, but preferably thirty, pounds of capped honey in frames. A well-filled frame will contain about five pounds of honey. If the bees have not been able to provide sufficient store

after the removal of supers in autumn, they should be fed rapidly with autumn syrup (179), replenishing the feeder with warm syrup as often as it is emptied: this feeding should be given rapidly, as all the food store must ripen in the cells before it can be capped, and it is therefore necessary to supply it before the period passes away in which capping can be completed (126). A cheap pattern quick feeder holding about one quart (40) or the round tin feeder (38), holding one quart, would be very suitable for autumn rapid feeding.

The beekeeper should seize the first favourable opportunity on a mild day in February to examine his hives in order to ascertain if the food supply is sufficient. The bees will not empty the upper portions of the back frames until all their other food supply has been exhausted: if, therefore, the cells in the upper portion of the back frame are empty, it is a clear indication that food is required. At this examination the bees should be disturbed as little as possible; therefore, neither smoke nor the subduing cloth should be used to subdue the bees. The coverings should be removed to permit the back of the quilt being gently turned forward until the three back frames can be seen; a subduing feather (64) may if necessary, be used to brush down the bees which rise; if the cells in these frames are capped, as far as can be seen without removing the frames, no food need be given; but if they are empty, and a frame of honey is not available, a cake of about five pounds weight of soft candy (174) should be placed on the frames over the brood nest under the quilt. This should support the bees until spring stimulative feeding is necessary.

The stocks should again be examined on a suitable day about the middle of March; if it is then noticed that the food supply is short, they should in late districts receive candy, preferably flour candy, given as above described (105). If, however, there is a sufficient food supply, stimulative feeding may be commenced when the time for it has arrived. In those districts in which in ordinary seasons there is a good flow of honey in May and June from tree blossoms, clover, &c., it is very desirable to stimulate early breeding; in such districts stimulative feeding may be commenced about the middle of March: if the bees are flying freely and carrying pollen to the hive it is a sign that stimulative feeding may be given. If pollen-bearing flowers do not abound in the district at this period, about a teaspoonful of pea flour per hive should be placed in some sheltered spot to which the bees have ready access; if no such suitable spot exists, an artificial shelter can be erected for the purpose near the hives; or a little pea flour may be dredged over flowers. If the district is one in which little honey is gathered before July, stimulative feeding should not

105. Supplemental Feeding at end of Winter.

106. Spring Stimulative Feeding.

be resorted to until April. If it is desired to stimulate breeding, scrape away the capping from about 2 to 3 square inches of comb, using a subduing feather between the frames to move the bees off the comb surface which is to be thus treated. The frame should be drawn back, not lifted up, for this operation. Repeat this process as necessity arises, increasing or decreasing the area of comb treated as may appear to be advisable. It would usually be sufficient to scrape the comb about once a week, but care should be taken at all times to leave a fair amount of sealed store untouched, say $1\frac{1}{2}$ to 2 in. in depth of sealed store on each of four frames. If there is not sufficient sealed store to permit of utilising it as above recommended, and in any case when the above treatment has started breeding fairly well, stimulative feeding by means of spring syrup (178), given by a feeder, should be commenced. The syrup should be given warm every evening, one hole of the feeder only being opened (38), and the supply should be shut off in the morning. The actual amount required will vary greatly; it should usually suffice to commence with about a quarter of a gill, and gradually to increase the quantity as required, taking care never to give so much that the bees will store it, and not to give syrup when the bees can collect enough food from flowers. Any honey which has been held over during winter in frames may advantageously be used for spring stimulative feeding, placing the frame at the back of the brood nest, and removing any empty frames not required. When spring feeding is being carried on, a half-inch wide opening only should be left between the hive doors, as a preventive against robbing (140).

XIII. PRODUCTION OF SURPLUS HONEY FOR SALE OR CONSUMPTION.

The production of surplus honey in bar-frame hives is carried on in two ways:—

- | | |
|---|---|
| 107. Methods of Producing Honey for Sale. | (a.) By producing comb honey in sections; |
| | (b.) By extracting liquid honey from combs. |

A strong stock would usually be ready for supering in early honey districts in Ireland, about the middle of May: in exceptionally early seasons they may be ready towards the end of April. To ascertain if a stock is ready for a super, peel off the quilt (65) sufficiently to expose about half of each frame to view; if on examining the frames from above it is noticed that on ten frames the bees are crowded, and that they have added new white comb to the old comb to a depth of about $\frac{1}{4}$ -inch on each side of the top bars in order to provide increased storage space for honey, a super may be put on.

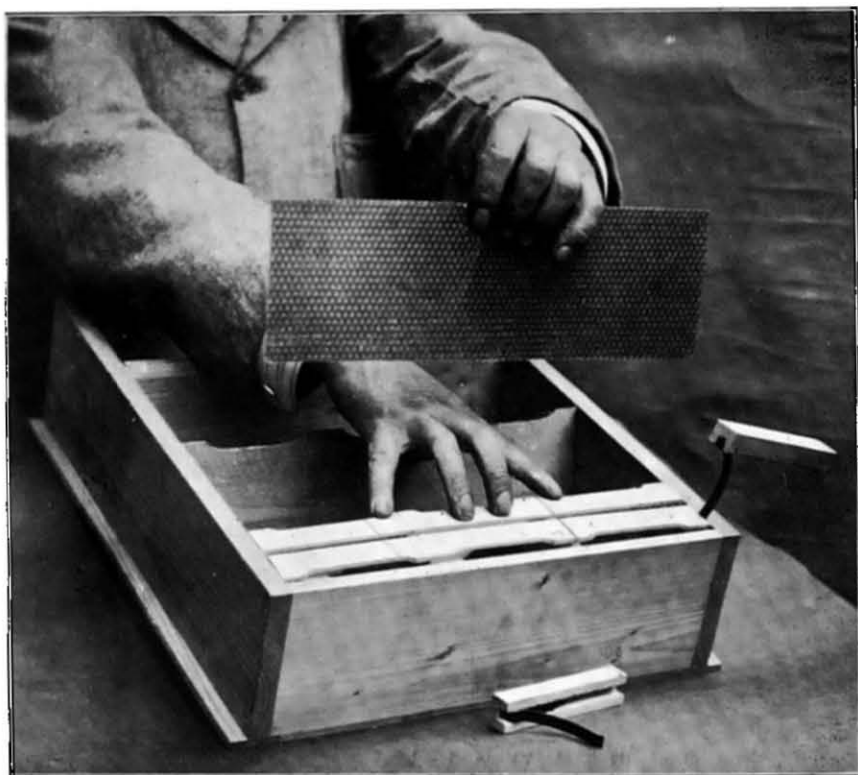


FIG. 35.—PLACING FOUNDATION IN SECTIONS.

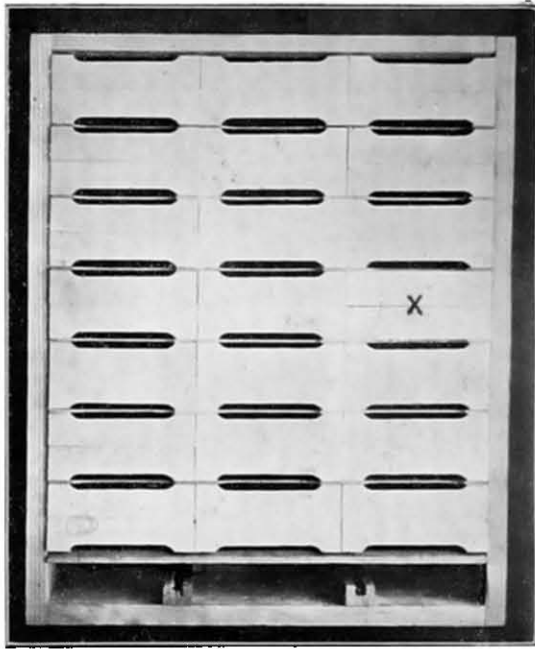


FIG. 36.—ECONOMIC CRATE FILLED WITH "D"
SECTIONS.

X, Section placed with wrong side up.

To prepare an economic section-crate for use, it is first necessary to fold the sections (27) required into shape: to do this, damp the grooved V-joints, then bend three sides inward until they form a square with the V-joints closed and lock the dove-tails (Fig. 6); this can be done conveniently by folding the section in an empty section-crate (29), using the side of the crate to ensure that the section when folded is square; then place three folded "D" sections (27) in a row across the front end of the section-crate (29), pressing them close up to that end of the crate, the unsplit side of each section resting on the crate rails. Wedge them in this position by inserting a wedge of wood between the front half of one section and the crate side, then while standing behind the crate, open the split in all three sections by drawing back the back halves of the sections with one hand (Fig. 85), then, with the other hand insert a 12½-inch by 4½-inch sheet of section foundation (34) into the space thus formed, letting it go well down into the splits; the thickness of the foundation will prevent its being let down as far as is necessary, therefore squeeze it by closing the sections, after which again draw back the back halves and lower the foundation into its proper place, almost to the bottom of the sections, leaving the upper edge of the foundation flush with the tops of the sections; press the halves of the sections tightly together with the follower (29), and if the operation has been neatly performed the foundation will be fixed in correct position and free from buckles. Next place a long separator (28) in position against this first row of sections, and place and fill the remaining sections in the same way until the crate contains twenty-one sections. Then place the follower behind the last row of sections, taking care to turn the bevelled edge towards them, and wedge it tightly against them by inserting two or three springs (29) between it and the back of the crate (Fig. 86). The first crate to be put on a hive should be covered with a piece of calico or other suitable cheap strong material, cut 18 inches by 18 inches, damped, and stretched neatly over the sections; over this should be placed another cover of woollen material, large enough to fall over the sides of the crate; it should be secured by a cord passed round the sides and tied firmly. Crates should be covered to protect from dust until required for use. Before placing a crate on a hive, smear the under sides of the crate including the laths with petroleum jelly, to prevent its being propolised and thus causing trouble when removed.

To place a section crate, uncover the hive, remove the lift, place the crate on the lift, remove the quilt, and
 110. Placing Section-crate. at the same time draw the subduing cloth over the frames (65) (Fig. 21); then with a hand on each side of the crate, hold it over and just clear of the cloth. While doing so grip the stick of the subduing cloth with

the fingers (Fig. 87c) of one hand, and with a rapid movement to one side jerk off the cloth and at once place the crate in position over the frames (Fig. 87D). If these movements are performed quickly, it will be possible to place the crate before a bee rises above the frames. The crate should be placed with its narrowest side to the front of the hive on an 11-frame hive, and with its broadest side to the front on a 10-frame hive. The front side of the crate should rest on the top bar of the front frame, and the sides of the crate should so cover the shoulders of the frames as to leave no spaces through which bees or heat can escape from the brood-chamber. If for any reason the crate is placed over less than nine frames, fit an extension board (95), $16\frac{1}{2}$ inches long, $\frac{1}{2}$ -inch thick, and as wide as is necessary, to lie across the body-box behind the dummy, so as to prevent bees getting behind the dummy; the top of this board should lie flush with the tops of the frames. Now, replace the lift, and pack well with cloths all round and over the crate, to prevent the escape of heat, taking care when doing so to pack well round the edge of the crate, and to avoid moving the crate out of position. Then place wedges between the back of the hive and the top bar of the dummy, to keep the latter in position.

If the conditions are favourable for collecting honey, and the stock is strong, it should be capable of taking another crate in about seven or ten days. Under very favourable conditions

111. **Tiering.** It might be advisable to give a second crate on the fourth or sixth day after giving the first. It is most important to provide additional storing accommodation for the bees in advance of their requirements, as otherwise they will probably start queen cells and prepare for swarming (91), which should be avoided if the production of honey is the object in view. The objection to putting on a second crate before it is required is that to do so would cool and therefore retard the progress of the hive. In exceptional circumstances the experienced bee-keeper may put on two crates together if he cannot add the second crate at the proper time, but this practice is one that should be avoided, if possible. If the weather has been favourable for honey gathering after putting on the first crate of sections, the beekeeper, guided by what has been stated, should examine the crate when or soon after it has been four days on, to ascertain if the bees are ready for a second crate. To do this, the covering of the crate should be removed just enough to permit of examining the outer sides of the last row of sections; the follower should not be removed, nor should the sections be disturbed, but the upper edge of the follower may be drawn back against the springs to widen the area of observation. If it is noticed that the combs are crowded with bees, or that the foundation sheets in the sections have been partially drawn out, a second crate may be added if the weather is favourable; but if the weather is unfavourable it should not be added until there is a change for the better.



FIG. 37A.—TIERING.

Removing first section crate from hive to place it on second crate.



FIG. 37B.—TIERING.

First crate in position on second crate, preparatory to replacing both crates on hive.



FIG. 37C.—TIERING.

Crates held in position immediately over subduing cloth, preparatory to moving the latter and placing crates on hive.



FIG. 37D.—TIERING.

Subduing cloth removed, crates in position on hive, the new crate next to the frames.

If, however, there are very few bees on the sides of the three back sections facing the follower, or if these sections have not been drawn out, a second crate should not be given until it has been ascertained by a further examination that one is required. To place the second crate or subsequent crates in position, proceed as follows:—Place the lift on the ground just by the hive, and on it place angle-wise, the new crate of sections (Fig. 37A); then, without lifting the crate which is on the hive, gently twist it from side to side to insure that it is free; if it is propolised, a knife-blade or turnscrew may be used to free it; then, having inserted the stick in the subduing cloth (43), place the stick against one side of the crate on the hive, seize the crate with both hands, gripping the stick of the cloth with the little finger of one hand (Fig. 37A), lift the crate, and in removing it draw the cloth across the frames and leave it on them, completely covering them; then hold the old crate just over but clear of the cloth, so as to drive the bees up into the sections, and then place it correctly in position on the top of the new crate, taking care to see that it is so placed as to prevent bees escaping between the crates (Fig. 37B). The frames should now be carefully examined for queen cells, which if found should be removed. Then grip the lower crate with both hands (Fig. 37B), hold the crates over the subduing cloth, and while doing so grip the stick of the cloth with the fingers of one hand (Fig. 37C), then with a rapid movement to one side jerk the cloth off the frames, place the crates in position on the body-box (Fig. 37D), and pack them precisely as explained above for placing the first crate (110). It is very important that the crates should be well covered with packing material on all sides as well as on the top; if the crates are not well covered all round, the outside sections will probably be incompletely capped, the honey in the cells failing to ripen owing to want of heat. A good method of packing two or more crates, is to wind a long strip of flannel, flannelette, or other suitable packing material, round the sides of the crates, and to fasten it with twine or pins; then put on the lift, and complete packing at the sides and top; the method often adopted of forcing the packing material down between the crates and lift with a narrow lath, is not so effective, and unless very carefully done, the operator is liable to press the crates out of their proper position and thus to leave spaces by which heat and bees may escape. If the weather continues favourable, in about ten days later a further examination should be made to ascertain if a third crate is required. If the back sections of the upper crate are then crowded with bees, it may be assumed that a third crate is required; the same procedure should be adopted in placing it as that above recommended for placing a second crate. If the stock is very strong, and the season is good for gathering honey, it may in certain circumstances be advisable to tier up to four or five crates in a similar manner, but a second lift will be required for more than three crates. This lift, which may be purchased, or made locally, should be deep enough to take two extra crates,

and made so that it shall rest on the lower lift, its sides flush with the sides of the lower lift, on which it is held by a 2-inch by $\frac{1}{2}$ -inch slip, tacked all round its outside lower edges. The advantages gained by tiering four or five crates together are that—(a.) The bee-keeper can then absent himself for a longer period than would otherwise be possible, with the assurance that the bees will have space enough for storing. (b.) The bees will not be disturbed or irritated by the removal of their stores.

The objections to tiering more than three crates are:—(a.) That if a bad spell of weather comes, the bees may rob the upper crates. (b.) It may be more profitable to market the finished sections at once, rather than to hold them over. (c.) The sections may not be so well drawn out and filled, and hence not so heavy as when the storage space is smaller. (d.) The bees moving over completed sections are likely to spoil their appearance, and thus reduce their market value.

The method of tiering above described is that which should be adopted under normal conditions, but if the honey flow is irregular, or if the close of the honey season is approaching it is best to place the empty crate on the top of those on the body-box.

One or more crates of sections may be removed at any time after the sections have been completely

**112. Removing
Section-crates.**

sealed, which may be ascertained by looking to see (111) if the sides of the sections next the last row are sealed; if that is so, the crates to be taken off may be removed on the morning of a fine day when the bees are flying freely, in the following manner:—Take off the crates which it is desired to remove and clear of bees, then repack as before those crates if any, to be left on; place the crates which are to be cleared on the top of the packing, inverting any which are completed, so as to avoid bringing brace combs which may be attached to the crates into contact with the hive coverings, or crushing bees which are clustering under the crates. Pack round but not over these crates. This operation should never be performed in the afternoon, as the bees, if they did not clear out of the crates before evening, would almost certainly puncture the sections. Before replacing the roof, see that the cone escape is clear. The bees should nearly all pass out by the evening; if they remain in the crates, search carefully for the queen, as it is possible that she may have ascended into the crates. Care should be taken not to over-subdue the bees when about to remove crates, as such procedure is calculated to make them puncture the capping. The bees should nearly all pass out by the evening; the crates may then be removed. If the honey flow ceases during the summer when crates are on, and may not be expected to come on again for some time, remove crates which contain completed sections, take out the latter, and make up a crate with the best unfinished sections, adding new sections as necessary, and replace the crate on the hive, holding over other incomple-



FIG. 38.—SECTION OF C. D. B. HIVE, SHOWING THREE CRATES OF SECTIONS IN POSITION.

NOTE.—Top sections completed; middle row partially filled; bottom row contains foundations only.



FIG. 39.—SUPER-CLEARER IN POSITION.
S, Super-clearer.



FIG. 40.—RACK FOR SPACING FRAMES IN DOUBLING-BOX.

sections for use when the honey flow comes on again. If crates containing completed sections are left on when the honey-flow has so far fallen off as to make the bees cease storing in the supers, the completed sections will probably be more or less damaged in appearance by the bees. The beekeeper must bear in mind that if the honey flow ceases during the ordinary period of its continuance, it is frequently advisable and sometimes essential to supply the bees with syrup to prevent the stock dwindling (103). The beekeeper may prefer to let the bees take down the honey from the supers, but even that supply of food may be insufficient to maintain a stock at this period. Many stocks have perished from inattention to this matter.

If it is preferred to use the wooden super-clearer (41), remove the lift (22) and place it on level ground close to the hive; place the super-clearer on the lift; then remove the crates that are to be cleared (111), place them on the super-clearer, and at once replace them on the hive as before, but with the super-clearer underneath them. Bees will pass out from the crates by the super-clearer both by night and day, whereas they will only use the cone bee-escape (42) in the roof, when bees are flying in the daytime.

Towards the close of the honey season it is necessary to provide for the completion of as many sections as possible. When it is considered that the honey flow will not last much longer, all the crates should be removed and taken to a room to which bees and wasps have not access. Then take out the sections, put away those that are completed, and replace the unsealed sections in an economic crate (29), putting the most advanced sections on the outer side of the crate, with the six section sides which are most thoroughly sealed to the front and back of the crate respectively, and the least advanced sections in the centre; if there are not sufficient sections for an economic crate, one or two divisions of the divisional crate (30) may be used (116); then replace the crate of unfinished sections on the hive in order that the bees may fill and complete them or take the honey down to the hive, as will be determined by the season. If there is little or no honey coming in, the uncompleted sections should be given to the bees behind the dummy, as described in paragraph 103, to empty as rapidly as possible. The empty sections may then be put away for use next season, taking care to wrap them up carefully in paper, cardboard boxes, or other suitable covering, so that they may be inaccessible to spiders, &c.

If a spare economic crate is available, it will be most convenient to fill the sections as described in paragraph 109, and then to separate them by cutting through the foundation between each pair of sections with a knife, or by breaking the connection by twisting the sections while holding them firmly,

**115. Preparing
Divisional Section
Crates for Use.**

to fill the sections as described in paragraph 109, and then to separate them by cutting through the foundation between each pair of sections with a knife, or by breaking the connection by twisting the sections while holding them firmly,

one in each hand, so that the foundation within each section shall not be disturbed; if an economic crate is not available, the same procedure may be followed, if the sections are placed in a line on a table, and held firmly together as they would be if in a crate; the sections may then be placed in the divisional crate, taking care so to insert the separators that the beeways shall be at the top and bottom.

When it is desired to use one division, or two divisions only of a divisional crate, to finish off sections,

116. Using Divisional Grate. they should be placed on the hive in the same manner as an economic crate (110), but the space over the frames on either side

of the crate or crates should be covered with two strips of canvas or other suitable material, which the bees will not eat through, the inner edges of which should be just caught under the sides of the crate. The crates should, of course, be warmly packed all over, as when using large crates.

The bee-keeper must ever remember that success in supering greatly depends upon very thoroughly and

117. Packing Section-crates. carefully packing all round the super-crates, so that they may retain sufficient

warmth to induce the bees to work in them; it frequently occurs that bees refuse to go up into supers, solely because the covering has been carelessly put on, and the temperature of the supers is too low. A little experience in supering will indicate to the beginner that the outer sections in a crate are generally the worst, not being so well drawn out or filled as those in the warmer interior parts of the crate; this clearly indicates the importance of carefully packing super-crates, using plenty of material for doing so. In very hot weather, when bees are clustering outside the hive it is advisable to reduce the amount of covering over the quilt, or so to loosen the covering as to provide extra ventilation; but care should be taken to make sure that sufficient covering is replaced before night.

XIV. WORKING HIVES FOR EXTRACTING.

Extracting signifies the operation of removing honey from the comb by a centrifugal machine, which

118. Extracting versus Sections. leaves the empty comb in a fit condition to be returned to the hive that it may be refilled by the bees. Hives may be

worked for extracting as an alternative to, or in conjunction with, the production of section honey. It is not advisable to work for extracting when there are less than four stocks in an apiary, nor when heather is the principal source from which honey is obtained. The relative merits of the two systems of producing honey may be shortly summarized as follows:—

The advantages of extracting are:—

(a.) Greatly increased honey production; a stock which

would on the average produce 60 lbs. of section honey, would probably produce 100 lbs. of extracted honey per annum.

- (b.) Cheaper production of honey per pound, neither sections nor section foundation being required.
- (c.) Very considerable reduction in the cost of forwarding to market, due to the fact that extracted honey can be easily and cheaply packed to bear transit without injury.
- (d.) Extracted honey, when held over for a lengthened period, deteriorates in quality less than section honey unless the latter is treated with exceptional care; all honey is likely to granulate when stored in a cool temperature, say below about 55° F.; granulation deteriorates and reduces the market value of comb honey more than that of extracted honey.
- (e.) It facilitates the management of an apiary, and when properly worked is probably the most effectual method of preventing swarming.

The disadvantages of extraction as compared with working for sections are as follows:—

- (a.) The initial cost is usually greater, as it is necessary to provide an extractor (49), ripener (50), strainer (51), uncapping-knife (52), doubling-box (31), and a frame-box (53), the whole costing from about £2 10s. upwards.
- (b.) If an extractor is used in common by several bee-keepers, the chances of spreading foul brood (165), if it exists in the district, are increased.
- (c.) Section honey of good quality can generally be sold for at least 50 per cent. more per pound than extracted honey.

It will be assumed that the apiary consists of four stocks, and that it is proposed to work two of these for extracting, and two for sections. In

119. Preparation of Stocks for Extracting. March, or early in April, select the two strongest stocks for extracting; other things being equal, the preference should be given to Italian bees (5), pure or cross-bred, as they excel as honey gatherers. If it is convenient to do so, it is advisable to use a 18 or 14 framed hive (21) for the stock which is to be worked up for extracting. Stimulate (106), if necessary, and pay attention to brood-spreading, in order to make the stocks as strong as possible. When the other two stocks which are to be worked for sections are strong in brood, withdraw from each of them the frame containing most capped brood, brush all bees off, and place one of these frames in each hive which is to be worked for extracting. If the apiary contains a backward but healthy stock, it may advantageously be united (133) to the stock which is to be worked for extracting; this operation may be conveniently carried out at the time of doubling (120).

but of course the stocks to be united should have been brought together (182) previously.

When the stocks for extracting are ready for supering (108), or better, a few days before they are ready for

**120. Placing
Doubling-box.**

supering, treat each hive that is to be worked for extracting as follows: Remove the hive from its stand, and if spring cleaning (186) has not been carried out, place a clean empty hive on the stand, uncovering it: this hive need not necessarily be capable of carrying more than 10 or 11 frames. Place the doubling-box (31) of the new hive on a sheet or board next the old hive. Now transfer eight frames from the brood-chamber of the old hive to the doubling-box of the new hive, including all frames containing honey, and as many frames containing brood as can be spared, having regard to the strength of the hive, carrying with the frames all bees on them except the queen: it is advisable to avoid transferring frames containing an excess of pollen; then transfer all the remaining frames, say three to six in number, to the body-box of the extracting hive, and make sure that the queen is on one of the frames in the body-box. If there are not six frames available for transferring as directed, add to the frames in the body-box of the extracting hive as many frames of brood withdrawn from other stocks as can be spared to bring the number of frames in the body-box up to six, or, if brood frames cannot be spared from other stocks, substitute for them frames of foundation, which should be alternated with the frames of brood in the body-box: it would be injudicious to commence with more than six frames in the body-box, as to do so would be likely to cause brood to be chilled owing to insufficiency of bees to cover the brood, but eventually the number of frames in the body-box should be increased to ten; fit an extension board (95) to prevent the bees passing from the doubling-box to the space behind the dummy; next cover the frames in the body-box with zinc or wire excluder (48), and over this fit the doubling-box in position on the body-box; then pack all round and over the doubling-box with woollen or other cloths, as when packing section crates (111). The procedure above described is that which should be adopted when the stock to be worked for extracting has not been transferred to a clean hive (186). If, however, the stock has already been transferred to a clean hive, it will, of course, only be necessary to remove frames from the body-box to the doubling-box, and to place the proper number of frames in the body-box, as above directed. When brood frames are transferred from other hives to the extracting hive, all bees should be brushed off them before their removal.

All brood frames in the doubling-box should be placed together in the centre; those in the body-box should be alternated with any frames of foundation which it may be necessary to place therein.

As the brood in the frames transferred to the doubling-box hatches out, the bees will fill the vacated cells with honey as soon as the honey flow commences: brood frames need not be again placed in the doubling-box unless it is desirable to do so in order to prevent swarming by the removal of such frames from the body-box of their own or any other stocks. The frames in the doubling-box should be examined on the sixth or seventh day after they were placed therein, and any queen cells found should be destroyed; these queen cells will be found on the faces of the combs, where brood existed. The frames in the doubling-box may be kept close together, in which case it may by degrees be filled to carry ten frames if that is desirable; in any case they should be kept close together until after the first extracting: some bee-keepers prefer to space the frames in the doubling-box at two inches apart from centre to centre; it will assist the beekeeper in thus spacing the frames and closing the spaces between the shoulders, to use a wooden spacing rack, as shown in Fig. 40; the reason for spreading the frames in the super to two inches apart, is to induce the bees to draw out the combs to the width of two-inch sections, but it may from time to time through the season be necessary to place them close together when returned after extracting, in order to permit of increasing the number of frames in the super, in which case it will of course be necessary to cut the combs down to their normal width before returning the frames to the doubling-box. If the frames placed in the doubling box carried drone brood, the hole in the doubling box (31) should be opened for one to two hours, two or three times weekly, until the drones have passed out.

It is best that the frames should be completely sealed over before extracting, but it may often be advisable to remove frames on either side of which from one-fourth to one-third of the cells are unsealed, in order to provide more space, or to make up a sufficient quantity for extracting, or to permit of transferring frames from other hives. Frames which have less than about two-thirds of the comb on each side sealed, should not be removed for extracting. When it is believed that some frames are ready for removal from the doubling-box, the beekeeper should examine them, removing the quilt from the back frames, and putting the subduing-cloth (65) on instead; if these frames are not ready, the front frames need not be examined; if they are ready, remove the quilt entirely, cover the frames with the subduing-cloth, letting it lie until the bees have gone down, and then remove all frames fit for extracting, first shaking the bees off them with a sharp jerk, or brushing them off with a feather, and place the frames in the frame-box (53) for removal to the extracting room, taking care to close the lid of the box at once as each frame is placed in it, to prevent robbing (141). On the first occasion

121. Further treatment of Stocks worked for Extracting.

122. Removal of Frames for Extracting.

of removing frames for extracting, say three weeks after putting the doubling-box on, it is necessary to examine the frames in the brood nest, as probably some of them will have been filled with honey only, and should be removed for extraction. Before opening the brood nest the bee-keeper should take one or two of the best-filled frames of brood from any hive which is being worked for sections and which might swarm if not checked; after brushing the bees off these frames, they should be transferred to the brood nest of the extracting hive as explained below. To examine the brood chamber frames, place the quilt on the doubling-box, which should then be lifted off, first tilting up one side so as to free it if propolised; then place it, with the frames in it, on a cloth or board on the ground; then subdue (65) the bees in the body-box, and remove from it all frames containing honey only, putting those which are capped in the frame-box (53), and those which are not capped in the doubling-box; then in lieu of the frames removed, place in the body-box the brood frames, if any, removed from other hives, with, if necessary, one or more frames of foundation; then replace the excluder zinc and doubling-box. Next, place in the doubling-box as many empty frames of comb as are required. If no empty frames are available, replace the doubling-box and cover the hive until the withdrawn frames of honey have been extracted, after which the necessary number of emptied frames can be added to the doubling-box. When adding empty frames to the doubling-box, first draw the partially completed frames to the back of the doubling-box and put the empty frames in front of them; thus the frames which will be first ready for removal will be at the back of the doubling-box. If frames are to be returned to the doubling-box after their honey has been extracted, they should be returned to the stocks from which they were taken; this precaution is unnecessary if such frames are held over a few days until the scent has somewhat disappeared.

When working hives for extracting, the greatest care should be taken to avoid doing anything which may
 123. Precautions against Robbing when Extracting. conduce to robbing (141); empty frames should not be returned to the doubling-box until after the bees have ceased flying. Frames of comb, whether full or empty, should never be left about uncovered, but should be kept covered in the frame-box or some other suitable place.

XV. EXTRACTING.

This operation should be performed in a room to which bees and wasps have not access, at a distance from
 124. Extracting. the apiary. There should be a fire in the room to keep the extractor warm if the temperature is cool. The honey should be extracted from the frames as soon as possible after their removal from the hive; if

they are cooled the honey will thicken, rendering its extraction difficult, and increasing the liability of breaking combs. The following articles should be in readiness in the extracting room : The extractor (49), ripener (50), strainer (51), two uncapping-knives (52), or one uncapping-knife and one table-knife, a wooden table, one or two large earthenware or enamelled iron dishes, and a tin or galvanised iron or wooden pail of about $1\frac{1}{2}$ to $2\frac{1}{2}$ gallons capacity, with a wooden lath laid across its mouth and tied to the handle lugs on each side. If the extractor has not been used before, or has not been thoroughly cleaned out since use, scald and rinse it out with two or three gallons of boiling water to clean and heat it ; in any case it must be rinsed out with hot water to heat it, and if the room is cool it is well to keep it near a fire and to turn it from time to time. Place the uncapping-knives in a jug of hot water ; then take a frame out of the frame-box, and hold it by one shoulder in the left hand, resting the opposite lower corner on a dish, and, with the knife in the right hand, cut upwards from the bottom with a sawing motion, thus paring off the cappings, which after a little practice can be cut off in sheets quite dry. When two frames have been uncapped, place them ends up in the extractor cages, and turn the handle so as to revolve the cages, slowly at first, but increasing the speed until it is just sufficient to cause the honey to be flung out of the cells ; after revolving the extractor for one minute, most of the honey will have been removed from the outer side of the combs ; the frames should then be reversed in the cages, and the operation repeated to clear their other sides, revolving the cages a little faster than before, until these sides of the combs are quite clear : the frames should then be again reversed in the cages, to complete the clearing of the sides first extracted. The reason for not completing the extraction of the first side in one operation is, to avoid the possibility of the comb being broken by being too rapidly revolved while containing a considerable weight of honey. If the combs are soft or new, it is best to extract only about half the honey from the side first treated, and to clear it after all has been extracted from the other side ; this will lessen the chances of breaking the comb. When extracting is over for the day, the extractor should be placed on a stand at such a height that the ripener, with the strainer on it, can be placed under the tap of the extractor, the honey in which should then be strained into the strainer, in which it should be left for at least one day ; the ripe honey may then be run off into tins (163), and any unripe honey, which may be distinguished by its thinness, should be left in the ripener or some similarly shaped vessel, covered with butter muslin or some other porous material, in a place where it can be kept at a temperature of not less than 80° F., under which conditions most of it will ripen ; any which does not ripen may be kept for feeding bees. When the honey is ripe its consistency will closely approximate to that of honey obtained from sealed combs taken from the doubling-box, and it will then remain

throughout of uniform consistency, whereas when it is unripe the lighter liquid will rise to the top : the process of ripening may occupy from say two to ten days, the period varying according to the condition of the honey and the temperature at which it is kept. The ripener should then be carefully covered, and the extractor and strainer should be cleaned, scalded, and covered to exclude dust, insects, &c. Frames hold from 4 to 6 lbs. of honey, according to the width to which they are drawn out. Shallow frames are largely used for extracting, especially in England, as the comb in them is less liable to break and easier to uncap than that in standard brood frames ; but, as they hold less honey than the latter, and are not interchangeable with them, they are not recommended. After frames have been extracted, those to be returned should be replaced (122) (123) ; if not immediately required, they may be kept hanging for a few days in some place to which wasps and bees would not have access, but as they would soon mildew, they should, if not required for a doubling-box, be placed behind the dummy (103) in a hive, preferably the hive from which they were taken, to be cleared by the bees. If foul brood (165) is prevalent in the district, great care should be exercised in thoroughly scrubbing the extractor before and after use ; and if there is the least suspicion that foul brood exists in the apiary, the frames from the suspected hives should not be transferred to any other hives, as has been advised above (119), (120).

XVI. WINTERING.

Successful wintering largely depends upon stocks being strong, and having a sufficient food supply ; therefore, when supers have been removed, the
 125. Preparing
 Stocks for Winter. bee-keeper should examine each hive carefully, to ascertain its condition with respect to strength of stock, brood, and store of honey. The strength of the stock can be best ascertained by examining it when few bees are flying. This may be done without disturbing the bees, by removing the quilt and looking down on the frames from above, without withdrawing them. The period at which supering should cease will vary from the middle of July to the end of September according to the district. At this period a strong stock which has been well managed should have sufficient bees to cover both sides of eight frames. If the stock is strong, covering both sides of eight frames, and that breeding is going on satisfactorily, and sufficient honey is coming in for breeding, it is only necessary to see that there are sufficient vacant cells for the queen to lay in ; if there are not, add a frame of empty drawn comb (90), if that is available. If less than eight, but not less than six frames are covered with bees on both sides, stimulative feeding should be resorted to (104), at the same time taking care, as above advised, to provide laying space for the queen. If less than six frames are covered with bees on both

sides, the stock should be united to another weak stock (133), or strengthened by adding driven bees to it, or by giving it a frame of capped brood from a strong stock: if these methods cannot be adopted, give stimulative feeding and keep the brood nest very warm to assist hatching. By carrying out the foregoing instructions, the stocks should be brought up to proper strength for wintering before the 1st October in late districts, and earlier in early districts. If the frames in the hive are not well filled, the number may be made up by selecting well-filled frames that can be spared from other hives, or by using some that have been removed during the summer; if such frames are slightly mildewed, they may be used without fear of harm ensuing, but any cells of capped dead brood which they contain should be uncapped. The stock should have 20, but preferably 30, pounds of honey for wintering, and if the store of honey is less than 20 lbs., rapid feeding (104), with autumn syrup (179) should be given.

The honey stored by the bees for winter food should be ripe

**126. Time to Feed
for Winter.**

enough for capping by the middle of October in late districts, and earlier in early districts; uncapped honey would not keep sound, and is unwholesome as food for bees, and if feeding is given too late the bees will be unable to cap it; the period for rapid feeding (104) must therefore be regulated accordingly, bearing in mind that in unfavourable, damp, or cold weather, honey may take quite a fortnight to ripen in the cells.

If the proper supply of honey (125) has not been stored and capped in sufficient time (126), the deficiency in weight should be made up by

**127. Feeding with
Candy.**

supplying a corresponding weight of soft candy; this candy may be given in a cake of the requisite size, laid across the top bars of the frames; on this lay the quilt, first slightly damping it, then cover as usual. Soft candy may be made at home (174), or it may be purchased in sections, glazed on one side, so that when such a section is laid over the feed hole in the quilt (102), glass side up, the bee-keeper can at any time see how much has been consumed.

The chief objections to retaining more frames in a hive than are re-

**128. Objections to
Wintering on full
Number of Frames.**

quisite for carrying the stock safely through the winter are, that the outside frames are likely to become mildewed, and the honey in their combs would probably granulate.

The frames on which the bees are to winter (125) should be pushed to the front with the dummy.

**129. Winter
Coverings.**

Three pieces of wood about six inches long and $\frac{3}{4}$ inch square, should be laid across the centre of the top bars of the frames about one inch apart, to form a passage by which the bees can pass from frame to frame without going under or round the frames, where the temperature would be lower than at the top of the

frames. A suitable passage can be made by using a small piece of the branch of an alder about $\frac{3}{4}$ inch in thickness, from which the pith has been removed, leaving a tunnel for the bees. If soft candy is provided over the frames (127), an artificial passage is unnecessary. The canvas quilt should be left on as usual, and over it should be spread a few woollen coverings or, a still better plan is to make a bag of cheap material, of such shape and dimensions that when partially filled with cork-dust, it may be laid as a cushion of about two inches thick entirely covering the frames and fitting closely to the body-box. Such a covering is admirably adapted for the purpose, as it retains the warmth in the hive, while permitting excess of moisture to escape readily. Another good method is to place over the quilt which lies on the frames a covering made from a piece of cheap red-edged tarred felt, which costs about 2½d. per yard: this should be beaten or rubbed with the hands to make it somewhat porous. It is thoroughly efficient as a bee covering, and is a good moth preventive.

To secure a hive for winter, the lift should be inverted and slipped down over the body-box; the porch if movable, being transferred to the lift. The doors should be closed to about four to six inches apart; the floor board ventilator should be closed. Hives in very exposed positions should be so secured by wire or rope as to prevent their being blown over (69). The less a hive is disturbed during the winter the better. If the roof leaks it should be covered with waterproof material: a cheap, simple, and efficacious method of treating roofs to render them waterproof is the following: apply a thick coat of paint to the roof, and while the paint is wet, cover it with strong, cheap calico, which should be pressed down on the paint, so that it shall fit closely to the wood. When dry, apply another coat of paint. On a fine day in February, the doors should be opened widely, and the front part of the floor board should be cleared of dead bees, &c., with a piece of bent wire, care being exercised not to touch the frames.

130. Securing
Hive for
Winter.

XVII. UNITING.

Strong stocks are always more profitable than weak stocks; the bee-keeper should therefore at all times endeavour to avoid having weak stocks.

131. Reasons for
Uniting.

Hence it will sometimes be necessary to unite two swarms, or two weak stocks, or to unite a weak stock to a stronger one. Uniting is also practised when it is desired to unite a queenless stock (145) to one that has a queen, and when in the autumn it is desired to reduce the number of stocks in the apiary. All uniting operations should, when circumstances permit, be performed when bees have ceased flying for the day.

To unite two swarms on the day on which they issued, or the day after, prepare a hive for their reception

132. Uniting Two Swarms. (75), place the hiving-board in position (76), remove the queen from one swarm, and place her (151) with a few bees in an empty match box or other suitable small box, to be kept thus in a warm place until it is ascertained that the other queen has been accepted; dust the bees in each skep or swarm-box with flour; this may be conveniently done by placing the flour in a small flour dredger, or a small canister in the bottom of which a few holes have been bored, and lightly dusting the bees while turning the skep or swarm-box about so as to expose them all to the falling flour; then, if there are two operators, throw the contents of each skep or swarm-box together on the hiving-board, and the bees will pass into the hive; but if the operation is performed by one person, it is best after flouring the bees to throw the contents of one skep into the other, and then to throw the whole out on to the hiving-board. Swarms should be placed in the position in which they are to remain permanently, as soon as possible after they issue: it is a wasteful practice to permit a swarm to expend its energy, building comb and storing food which is ultimately to be lost.

To unite two stocks which are in bar-frame hives, the stocks to be united should be brought within six feet of each other (182), (183), when that can conveniently be done. If both stocks have queens, the least valuable queen should be secured and boxed (132). Then crowd the bees in each hive upon as few frames as possible, taking care not to remove any containing brood; this should be done on the evening before, or at least some hours before, uniting. Place an empty hive between the two stocks, uncover it, and place the dummy only in the body-box. Give a few puffs of smoke to each stock at the hive entrance (66), or if a smoker is not available, insert two subduing feathers (64); after three minutes uncover, and place subduing cloths (65) over the frames in each hive. Then lift the back frame of one stock, dust the bees on both sides of the frame with flour (132), and place this frame at the back of the empty hive; then deal similarly with the back frame of the other hive, and so on with the remainder of the frames, placing them alternately in the centre hive. When all frames have been removed from the old hives, any bees remaining in them should be dusted with flour; then remove the body-box from the floor-board of one of these hives, and place its floor-board against the entrance of the centre hive, and brush off on to it any bees in the body-boxes or on remaining floor-board of the old hives. The hive should then be covered up as usual. If any fighting is observed at the entrance, a few puffs of smoke should be driven amongst the bees to quiet them, and a few smart blows should be

given to the body-box, to cause the bees to gorge themselves, which will have a quieting effect. The hive should then be covered up as usual. If a spare hive is not available, first dust with flour all the bees on the frames in one hive, then spread these frames, leaving spaces between them for the alternate insertion of frames from the other hive; dust the bees on the frames in the second hive, and as that is done, transfer each frame to the space available for it in the first hive. Provided that when uniting two hives the frames from each hive are placed alternately in the new hive, it is not necessary that they should be inserted in the precise order in which they hung in the old hives; the operator should rather place them in the most suitable positions, having regard to the condition of each frame, of course keeping the brood frames in the centre. If on examining the hive on the next morning, it is found that the queen has been accepted by the united stock, the reserve queen may be destroyed.

To unite a swarm to a stock in a bar-frame hive, place an empty hive alongside the hive to the stock in which the swarm is to be united, subdue (65) the bees of that stock, and then transfer three or four frames of honey or brood from it to the empty hive, first shaking or brushing the bees off these frames, and, if necessary giving a frame of foundation in place of the frames withdrawn: the frames left in the stock hive should be covered at once; then hive the swarm (76), (80) in the hive to which the frames were transferred. After twenty-four hours the bees in those two hives may be united (133). If an empty hive is not available, utilize the space behind the dummy for the reception of the swarm, transferring thereto the frames on which the swarm is to be hived, and making a temporary entrance, about $\frac{1}{2}$ inch by $\frac{3}{4}$ inch, or $\frac{1}{2}$ inch round, at the back of the body-box for the swarm: after 24 hours the stocks may be united as described in the latter part of par. 133. If it is desired to remove the queen of the swarm, this must not be done until the moment for uniting has arrived, as otherwise the swarm would abscond; but if desired the queen may be secured, and placed over the frames in a wooden match-box, in each side of which a few holes should be bored to enable the bees to ascertain that the queen is therein.

135. Uniting a Stock in a Fixed-Comb Hive to a Stock in a Bar-frame Hive. To unite a stock in a fixed-comb hive to a stock in a bar-frame hive, first drive the bees from the fixed-comb hive (VIII.), then proceed as described in paragraph 134.

136. Uniting two Stocks that are in Fixed-Comb Hives. To unite two stocks that are in fixed-comb hives first drive each stock (82), (84), then unite the driven bees as when uniting two swarms (132).

Always unite in the evening, after bees have ceased flying. If the bees that are to be united are short of food they should be fed rapidly (XII.) with warm summer syrup (178), given on the evening before uniting will take place. Bees whose honey sacs are full, are not only quieter on that account, but they will be more readily accepted by the bees to which they are to be united.

137. Points to be observed in Uniting Operations.

XVIII. WAX EXTRACTING.

Beeswax is worth about 1s. 4d. per pound. The economical beekeeper should therefore preserve all old comb, cappings, and scraps of foundation, to be melted into beeswax. Several patterns of extractors by which the wax is melted by steam heating, are sold at prices varying from about 10s. upwards; there is also a solar extractor in which the wax is melted by the heat of the sun. Steam extractors give the best results, and should be used by those who have to deal with much comb, but the system of rendering wax by boiling in water is very simple, costs practically nothing for appliances, and gives satisfactory results; this system is therefore the most suitable for owners of small apiaries.

138. Wax Extracting.

To extract beeswax by rendering, provide a clean iron pot of about eight gallons capacity; make a bag of coarse open texture sacking to contain the comb which is to be rendered; a bag about 15 inches long by 10 inches wide would be suitable for an 8 gallon pot. Reject any comb containing brood. Clear the combs of pollen as much as possible by shaking them and then by rinsing them in luke-warm rain water; then squeeze the comb into balls, and place these balls in the bag; tie its mouth securely, and place it in the pot, letting it rest on a piece of wood to prevent its being burnt: place a heavy flat stone on the bag to press it down, put sufficient soft water in the pot to cover the bag by three inches in depth and yet to leave a space of at least three inches between the surface of the water and the top of the pot, so as to avoid the risk of setting the contents on fire when boiling; boil slowly for about two hours, after which cool; as the water cools a thin cake of wax of fairly good quality will form on the surface; remove any dross adhering to its under surface, then break it up and place it in a bowl which has been rinsed with boiling water, after which about one to four tablespoonfuls of water should be placed in the bowl to prevent the wax sticking to it; then set the bowl in a saucepan of water which should be heated until the wax in the bowl is thoroughly melted; it may then be ladled into moulds or allowed to cool in the bowl. By this system about three pounds of very fine wax can be rendered in one boiling

139. Extracting Wax by Rendering.

in an 8 gallon pot ; more could be dealt with by using a larger pot.

XIX. ROBBING.

The term "robbing" as applied to bees, signifies the robbing of the honey stores in one hive, by the bees of another.

140. Robbing.

Robbing is generally brought about by one or more of the following causes:—(1) Weakness of stocks, rendering them unable to properly guard their stores. (2) Careless and unnecessary exposure of honey-comb or feeding syrup, and supplying food to stocks when bees are flying. (3) Ill-fitting hives, which permit the access of strange bees to the honey store by openings other than the door, and which, owing to the odour of honey from the hives, tempt strange bees to rob. (4) Unduly exposing hives for purposes of manipulation when honey is scarce. (5) Placing the hives too close together, that is, within less than six feet of one another. (6) Queenless stocks (145), which rarely vigorously defend their stores. (7) When manipulating stocks in an apiary containing several hives standing near one another, failing to observe the very necessary precaution to avoid so far as possible opening a stock which stands next and close to the one last treated.

142. Signs of Robbing.

When robbing is going on bees will frequently be noticed fighting on the alighting board ; it will be observed that frequent struggles take place, the bees of the attacked hive gripping the robbers, and if strong enough to do so, killing them.

143. Preventive Measures.

For the prevention of robbing, avoid the causes of robbing mentioned in paragraph 141. Keep stocks strong ; unite weak stocks ; if robbing has commenced, narrow the entrance to about $\frac{3}{4}$ inch wide, just enough to admit one bee ; cut a piece of glass about 12 inches long and 2 inches wide, and let it rest on the alighting board, leaning against the hive front, so that the bees going out of or returning to the hive must pass round it, while the robber bees will be puzzled by this arrangement and render it easier for the attacked bees to defend themselves. The glass should, of course, be put in position when bees are not flying. If several hives in an apiary are robbed at the same time, it is very likely that all the robbing is done by one stock ; this can be ascertained by flouring (132) the fighting bees, and ascertaining which hive the robbers return to ; if it is found that the robbing is due to one stock, its hive should be removed to a site more than two miles away (182). Another good method is to put a wisp of hay damped with subduing solution (180) on the alighting-board, leaving a sufficient passage to the entrance for the bees of the stock ; it should be

damped occasionally with the solution while in use, and removed after a few days if the robbing has then ceased. Another method which might be adopted when the above-mentioned preventive measures prove ineffectual, is to provide a tunnel about 2 inches long, $\frac{1}{2}$ inch wide, and $\frac{3}{8}$ inch high, made of perforated zinc, and fitting close against and covering the entrance; the tunnel should be placed in position after bees have entered the hive in the evening, and should be so fixed on the alighting-board that though secure it may easily be removed; the robbers will try to enter at the ordinary place close to the hive door, and will rarely try to enter by the tunnel, the narrow passage of which while affording means of egress for the bees in the hive, could readily be defended by them; as the bees of the attacked stock will probably on their return crowd at the hive entrance, the tunnel should be removed for a short time after bees have ceased flying for the day; the robber bees will then have returned to their own hives, and only the bees belonging to the robbed stock will enter; after they have done so the tunnel should be replaced in position: this treatment should be continued for a few days, until robbing appears to have ceased. The Swiss entrance (21) is a preventive against robbing.

XX. REARING, CHANGING, INTRODUCING, FORWARDING, AND WINTERING QUEENS.

As explained in paragraph 6, a prolific queen rapidly exhausts herself when afforded every facility for laying in a bar-frame hive; as such queens deteriorate in egg-laying powers after two seasons, they should not as a rule be retained longer. It may also be necessary to re-queen a stock for other reasons; possibly because the queen has been rendered useless by an injury received: queens are sometimes injured or killed when frames are carelessly or roughly handled; or the queen may be lost when on her nuptial flight, owing to her having been seized by a bird, or having fallen into grass, or failing to recognise her hive on her return to it.

A virgin queen is very active, and difficult to find; it therefore frequently occurs that on examination of a hive after the issue of a swarm or the supersedure of a laying queen, neither eggs nor brood are to be seen, nor can a queen be found; nevertheless it is quite possible that a virgin queen or one that has not begun to deposit eggs is present; such a queen would be apt to take to flight if on a frame which has been removed from the body-box and exposed to bright daylight for examination; great care should therefore be taken to avoid lifting out a frame carrying the queen: a simple and reliable method of ascertaining whether or not a queen is present is to examine one or two of the centre frames which the operator should hold while standing with his back to the strongest light; if about the centre of any comb there is a circular patch of empty dry cells highly polished

at the bottom, surrounded by cells containing honey or pollen, it is an almost certain sign that there is a queen in the hive, as these cells have been prepared for her to deposit eggs in.

The signs that a stock is queenless are as follows :—On the first day after losing their queen, the bees run

145. Queenlessness. about in a bewildered, agitated state, in and out of, and over, the hive, this commotion being most observable immediately, say one hour, after the loss of the queen ; in 48 hours they will have quieted down, and may work, but do so in a half-hearted way ; those returning to the hive will often linger on the alighting board, as if undecided whether to enter or not ; in spring, little or no pollen is brought in (7) ; and drones are allowed to remain in the hive after other stocks have expelled theirs (8). When such signs are observed, narrow the entrance to $\frac{3}{4}$ inch wide to prevent robbing (140) ; examine the hive when other bees are not flying, and if there is no queen, and if there are no eggs nor brood present, except possibly those of a drone breeding queen or a fertile worker (7), the stock should be re-queened or else united to another stock (133) possessing a queen.

When a fresh queen is required she may be procured from

146. Providing Queens.

another apiary, care being taken to select one from a stock which is unrelated to the stock for which she is intended, or the beekeeper may have one or more queens in readiness in nucleus hives (148), from which he can take a queen ; or he may utilise a ripe queen cell. A stock should never be without a fertile queen, except when it is left thus in order that it may more readily accept a fresh queen (152) ; therefore any method of re-queening which necessitates leaving the stock queenless, or with an unmated queen, except for the purpose just mentioned, is objectionable ; the beekeeper should therefore arrange to keep in readiness a supply of mated queens : some people may prefer to purchase queens from time to time, rather than to devote to queen rearing the small amount of extra time required for that purpose ; but all who desire to work their stocks to the best advantage, should rear queens in nucleus hives. Queen rearing is not more troublesome than many other practices carried out in ordinary beekeeping, and it should be regarded as an essential part of intelligent up-to-date bee-keeping. Change of blood is as essential in apiculture as in stock breeding, therefore it is most desirable that a queen from an unrelated stock should be introduced occasionally, and when she has been tested and proved satisfactory the young queens reared in nuclei should be raised from her, or she may be used to produce drones. In selecting a queen from an unrelated stock for the purpose of introducing fresh blood to the apiary, great care should be taken to insure so far as possible that the new queen is from an apiary that is free from foul brood, and that she is of a prolific strain, noted for producing a good race of workers.

A queen which it is intended to use for queen rearing, should be selected from a strain known to be prolific,

147. Preparing for Queen Rearing. she should herself be a prolific breeder, producing bees which are good workers, good cappers of cells, and not disposed to gather too much propolis. A queen procured from another apiary should be tested as to these points before she is extensively used for breeding queens. Select a stock containing such a queen; this stock should be well furnished with good fresh worker combs, and should be in thoroughly good condition for wintering; remove all drone comb from this stock, which may be called stock "Q." Stimulate (106) and spread brood (90) in the spring, so as to bring this stock forward as much as is desirable.

When stock "Q" swarms, hive the swarm as described in paragraph 95. Then move stock "Q" to

148. Forming Nuclei from a Swarmed Stock.

a position clear of the line of flight of bees from the other hives, at which place the nucleus hive or hives are later on to stand; then transfer the frames from stock "Q" to the nucleus hive or hives (57), using three frames to form each nucleus, and taking care that each nucleus shall contain one or preferably two sealed and perfect queen cells, and that the brood, food, and bees shall be equally distributed amongst the nuclei. Frames containing queen cells must not be shaken, nor jarred, as the young queens in the cells might be injured by doing so; if it is necessary to remove bees from such frames, do so with a feather. Cover the nuclei snugly, and if they must be placed near other hives, let them face in a different direction. The presence of eggs regularly deposited in a nucleus hive indicates that the queen has been fertilized, she may then be introduced into any stock which it is desired to re-queen (152); each nucleus hive may be further utilized for rearing queens (149); when no longer required for that purpose, the nuclei may be united with each other, or with stock hives.

If it is desired to provide additional nuclei to accommodate all the perfect queen cells in the nuclei formed

149. Providing additional Nuclei.

from stock "Q" (148); take from a strong stock one frame of honey and pollen and two frames of sealed brood together with the adhering bees, but taking care that neither the queen nor a queen cell is on any one of the frames; place the three frames with the bees adhering to them, in a nucleus hive, and shake the bees of three other frames on to them; all the old bees will return to the parent stock, leaving only the young bees in the nucleus to nurse the brood. Cover up; place a wisp of grass in the entrance, through which the bees will have to cut their way to find an exit; this will cause them to mark the site; place the nucleus hive where it is to stand (148); put two frames of drawn worker comb or foundation in the parent stock to take the place of the three frames removed, and on the following day

introduce to this newly formed nucleus hive a queen cell from one of the nuclei already formed, by carefully cutting out the queen cell with sufficient adhering comb to permit of its being thereby attached by a pin to the nucleus comb : great care must be taken not to crush, jar, or chill the queen cell during this operation.

Keep the nuclei well covered, to conserve heat. Attend to feeding, giving syrup if necessary (103),

150. Management of Nuclei.

or better, give a frame of sealed food from a stock that can spare it. When the presence of eggs regularly deposited denotes that young queens in nuclei have been fertilized, they may be given to stocks in which they are required to replace aged or defective queens : when a queen has been removed from a nucleus, a capped queen cell or brood frame containing a queen cell or eggs may be introduced to the queenless nucleus for the purpose of providing another queen (149).

There are many good queen cages ; it will suffice to describe the use of one, the "Abbott" cage (55) ;

151. Caging Queen. which can be recommended. If the queen is on a frame, have the cage at hand,

opened to receive her ; rest the frame on which the queen is on the hive, supporting it with the left hand, and with the right hand catch the queen gently by the wings (Fig. 41), insert her by the opening at the bottom of the cage ; as soon as her body is in the cage let go her wings, cover the opening with a finger, and when she moves up the cage, adjust the wire to close it. If the queen has been received in a box, take it to a room, close the window, open the box by lifting the lid ; do not slide the lid, as the queen might be injured by doing so ; catch the queen by the wings and cage her as above described. The queen should always be held by the wings or the thorax, but never by the abdomen.

If it is desired to place the queen in a match-box (153), in lieu of a cage, the queen if in a hive may be caught as above described and placed in the match box ; but if the queen is to be transferred from the travelling box (154) in which she was received to a match box, all that is necessary is to open each box sufficiently to allow her to pass from one into the other when they are placed in contact.

The best time for general re-queening of stocks is the autumn.

152. Introducing Queen to Stock by Cage or Match Box

There is a danger of bees objecting to a newly introduced queen, and killing her by "balling" her, that is, surrounding her and hugging her or starving her to death. It is therefore best, especially in the case of a valuable queen, to adopt the precaution of introducing her by means of a cage, such as the Abbott queen cage (55), which may be introduced between two frames in the centre of the brood nest, through a hole in the quilt large enough to let the cage pass

freely through it. Whatever may be the method by which a queen is introduced to a stock, it is always best that she should not be released until the evening, and if it is desired to introduce a queen to a stock in the daytime, it is best to do so by means of a cage or match box as described in this paragraph. A caged queen may generally be released with safety 24 hours after her introduction. Before introducing a queen, make sure that there is neither a queen nor a queen cell in the hive. A stock that has been queenless for twenty-four hours, will be in the best mood to receive a queen. If a stock has been queenless and broodless for more than a week, give it a frame of brood the day before introducing the queen, and keep her caged for two days. Examine the stock a few days after introducing a queen, to ascertain if she is all right.

If the dome cage (55) is used, get the queen into the cage, place the latter on a card, and then lay the card with the cage on it on the honey cells in the comb of a frame taken from the centre of the hive in which it is proposed to introduce her, laying the frame horizontally for that purpose: then carefully withdraw the card, and while taking great care not to injure the queen, screw the cage into the comb to the depth of the cells; leave it thus for thirty-six to forty-eight hours, and then release the queen; after doing so, watch her closely, and if the bees attack her, cage her again and leave her for twenty-four hours longer, after which she may be released.

Another method is to introduce the queen by a match-box as described in paragraph 153, but instead of allowing the queen at once to enter the hive, the match box when placed in position should only be opened $\frac{1}{2}$ inch, just sufficiently to allow the bees in the hive to have access to the queen, but not to enter the match box, and taking care that the match box is so placed as to permit of this; after twenty-four hours the queen may be released as described in paragraph 153.

A queen may be introduced by any of the methods mentioned in this paragraph, at any hour of day or night, but she should not be released until after dusk. A queen may generally be released with safety twenty-four hours after she has been introduced.

As a general rule, queens may be introduced to hives by the "direct" method, with every prospect of success, provided that the operation is performed after nightfall, that the queen has been fasting for at least half-an-hour, and that the stock has been queenless for at least six, preferably for twelve to twenty-four hours.

153. Direct Introduction of Queens.

Place the queen in an ordinary chip or cardboard box for holding matches; after dark, turn back the flap of the feed hole in the quilt (102) sufficiently to leave a hole through which the queen can pass into the hive, place the match box over this hole, in such a position that the box shall cover the hole, and that when the box is

slightly opened the queen shall have access to the hive : all this should be done as quietly as possible without using a subduer or disturbing the bees ; then slightly withdraw the cover of the match box, leaving the inner portion in position over the hole in the quilt ; the queen will then move quietly into the hive ; cover up and leave the hive undisturbed for two days.

Bees may be safely forwarded by post in boxes made for the purpose, accompanied by a few workers

154. **Sending Queens and a supply of food.** The style of box by Post, illustrated (Q., Fig. 17) is very suitable ; it

consists of a piece of wood four inches long by two inches broad by $\frac{3}{4}$ inch thick, in which two holes of $1\frac{1}{4}$ inches diameter are bored to a depth of $\frac{1}{2}$ inch, the holes being 1 inch apart from centre to centre ; two small holes $\frac{3}{8}$ inch in diameter are bored to the same depth at the end of and opening into one of the large holes ; the box is covered with a lid of perforated zinc, secured at one end by a tack. When required for use fill the two small holes with a mixture of honey and soft candy (174), or honey and fine white sugar, worked together to the consistency of stiff putty, put 18 to 24 workers in the large space and then place the queen in that space with them ; tie the cover in position, then loosely wrap the cage in a strip of calico, linen, or paper, taking care to leave ample ventilation, tie over all, and attach an address label, or enclose the whole in an envelope, the corners of which should be cut off to afford ventilation ; mark the package "Live Bees."

As it is always advisable to have on hands spare fertile queens,

any queen not required at the end of the season may be wintered on three or four frames placed behind the dummy of a stock hive ; these frames should be well

155. **Wintering Spare Queens.** crowded with bees, and fully two-thirds of two of them, and at least half of the others, should be filled with sealed stores. An entrance should be made at the back as for nuclei (57), and an alighting board should be fitted.

XXI. STORING AND MARKETING HONEY.

When it is intended to sell honey, the sections as removed from the hive should first be cleaned by

156. **Grading and Storing Sections.** scraping the wood to remove any wax or propolis adhering thereto ; they should then be graded into classes as follows :—

First grade sections should weigh 17 ounces gross, be well filled, completely and evenly capped, free from brood marks and pop holes, with even faces to the combs, uniform in colour, of good appearance and quality, and firmly attached to wood all round. Second grade sections should correspond to first grade sections, except that the weight may fall as low as 15 ounces gross, and the other conditions need not be so thoroughly fulfilled. All other sections may be regarded as third grade, and such as will sell only



[FIG. 41.—HOLDING QUEEN.

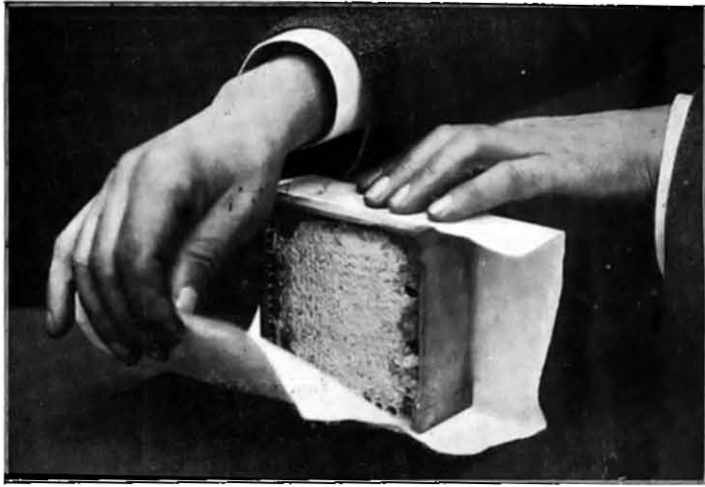


FIG. 42.—WRAPPING A SECTION.

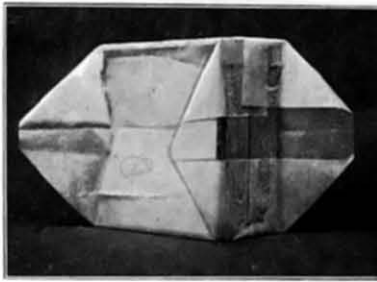


FIG. 43.—WRAPPING A SECTION.

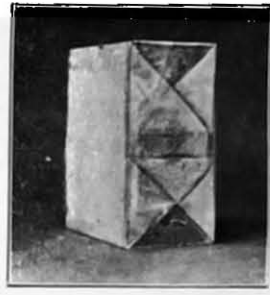


FIG. 44.—WRAPPED SECTION.

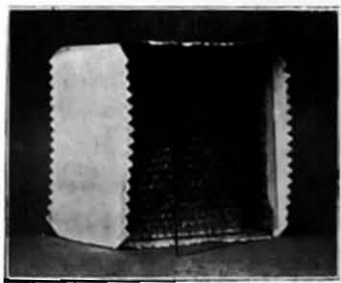


FIG. 45.—SECTION PREPARED FOR GLAZING.

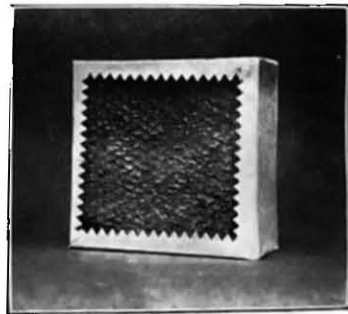


FIG. 46.—GLAZED SECTION.

at a low price. Having graded the sections, store them until required for sale in a dry warm place, the temperature of which should not fall below 60° F. It would be well to pack them in tin, cardboard, or other suitable boxes, to keep them free from moths, dust, &c.

Extracted honey may best be sold in tins holding about 56 lbs., fitted with close-fitting lever lids (Fig. 50).

157. Grading and Storing Extracted Honey.

If desirable for purposes of sale, the honey may be put into glass jars; many shapes and styles of glass jar are sold for the purpose, particulars of which can be obtained from most dealers in apiarian appliances. Extracted honey, like section honey, should be kept in a dry warm place until sold.

All sections should be wrapped in transparent wax paper, or glazed, before they are sent out for sale. Glazing is necessary for certain English markets, but wax paper wrapping is considered sufficient in Ireland and in many English markets.

158. Covering Sections.

Wax paper for wrapping one pound sections, cut into proper sizes, about 12½ inches by 7½ inches, is sold

159. Wrapping Sections in Wax Paper.

at about 6d. per 100 sheets. To wrap a section proceed as follows:—Place the section with the bottom side, that is, the unsplit side of a "D" section, downwards on the wrapping paper in such a position that one end of the sheet may be folded over it as shown by Fig. 42, leaving equal margins of paper on either side of the section; fold the paper over the section as shown in Fig. 42, pressing it firmly down on the top of the section; then apply paste to the paper on the top of the section, and fold back over it the other end of the sheet pressing it firmly down so that it shall adhere to the upper side paper; then fold the projecting margins of the paper as shown in Figs. 43 and 44, and fix them neatly in position with paste. If a label is used, it should be attached to the paper on the top of the section. The top side of the section should be kept upwards, to prevent leakage of honey from any cells the capping of which may be imperfect.

If sections are to be glazed, provide squares of the lightest glass procurable, cut 4½ inches by 4½ inches, costing about 2s. to 2s. 6d. per 100 squares; provide also slips of suitable paper of any approved colour 18 inches long by 2½ inches broad. Coat one slip of paper with paste, place the section on it at ½ inch from one end, and so as to allow the same amount of margin on either side, turn the section over on the paper, pressing the latter firmly and neatly against it all round (Fig. 45); the ends of the paper will slightly overlap. Now place the glasses in position against the wood on either side, and turn the margins of the paper down over them so that they shall thus be held firmly in position (Fig. 46). If

160. Glazing Sections.

desired, slips of lace-paper about $\frac{1}{2}$ inch wide may be used in lieu of wide slips as above described, but they do not protect the wood, nor do they make as secure a binding for the glasses as the method above recommended. Lace-paper frilling, in pieces about 20 inches long, costs 6d. to 7d. per 100 slips.

When small quantities of sections are to be forwarded, a good method of packing them is to use the cheap travelling crate (Fig. 49), which can be put together by any intelligent person. It can be made to hold eight or any smaller quantity of one-pound sections for parcel post; the crate for eight sections consists of two end pieces of wood $5\frac{1}{2}$ inches by $5\frac{1}{2}$ inches by $\frac{1}{2}$ inch, joined by eight pieces of sawn plaster lath, cut 17 to 18 inches long: these may be purchased three feet in length in bundles which may be sawn in two. The laths are nailed to the sides of the squares, against which are placed two pieces of corrugated paper $5\frac{1}{2}$ inches by $5\frac{1}{2}$ inches. Carefully drawn hay or straw, long enough to wrap round four sides of a section, should be laid neatly in and across the crate from end to end, each wisp lying against three sides of the crate and sufficient ends being left to permit of their being folded across the fourth side. The sections, previously wrapped in wax paper should be re-wrapped in stiff packing paper, and then firmly tied in one long package, the ends being protected by wood or cardboard squares $4\frac{1}{4}$ by $4\frac{1}{4}$ inches (Fig. 47); this package should then be wrapped in brown paper, again firmly tied, and then pressed down into the straw or hay in the crate (Fig. 48), and the ends of the straw or hay wisps should be drawn over the package and secured down by laths (Fig. 49). If desired, several crates thus packed might be enclosed in one large crate to be forwarded by rail. Care should be taken not to forward sections by post or rail unless they are firmly attached to the wood on all sides.

When sections are to be forwarded by rail, a good method of packing is to place them in wooden or cardboard boxes holding one dozen sections, and then to re-pack these boxes in large boxes or crates, holding six of the smaller boxes. The internal dimensions of the outer case should be, 2 ft. 6 in. in length, 1 ft. 4 in. in breadth, 1 ft. in depth; a thick layer of straw should be placed all round the small boxes, and a light layer of straw between them.

Extracted honey may be conveniently forwarded in bulk in tins holding about 56 lbs. (Fig. 50). Such tins, with lever lids, cost about 1s. 6d. each, and should be packed in wooden crates or cases, also costing about 1s. 6d. each. Extracted honey forwarded in glass jars should be very carefully packed, to provide against breakage.

**161. Marketing
Honey. Parcel
Post Crates.**

**162. Packing
Sections for
Forwarding by Rail.**

**163. Packing
Extracted Honey for
Forwarding by Rail.**

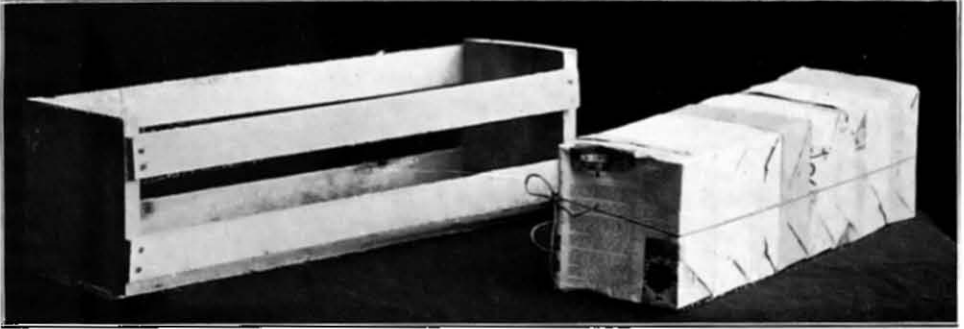


FIG. 47.—LATH CRATE, AND SECTIONS WRAPPED IN STIFF PAPER PRIOR TO PACKING IN STRAW.

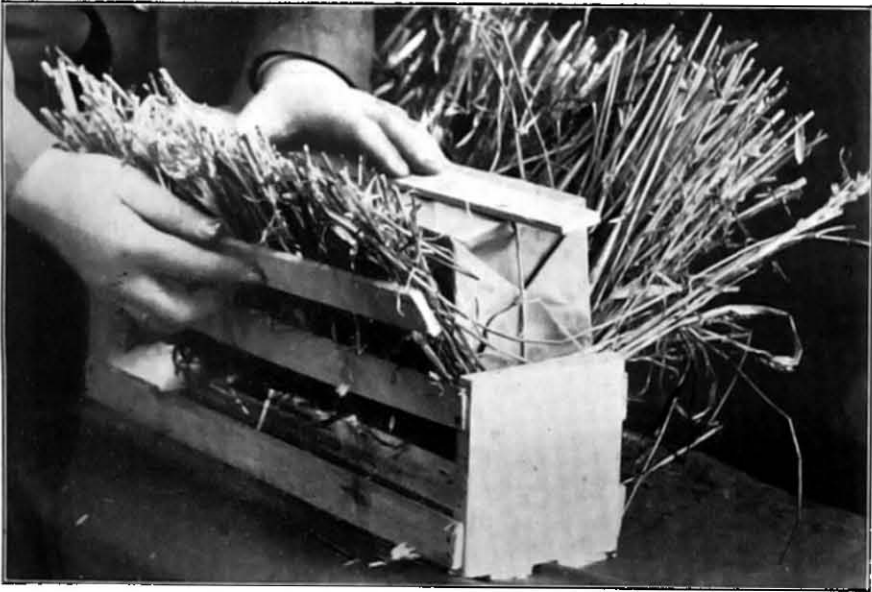


FIG. 48.—PRESSING BALE OF SECTIONS INTO CRATE.

Note pressure applied by lath.

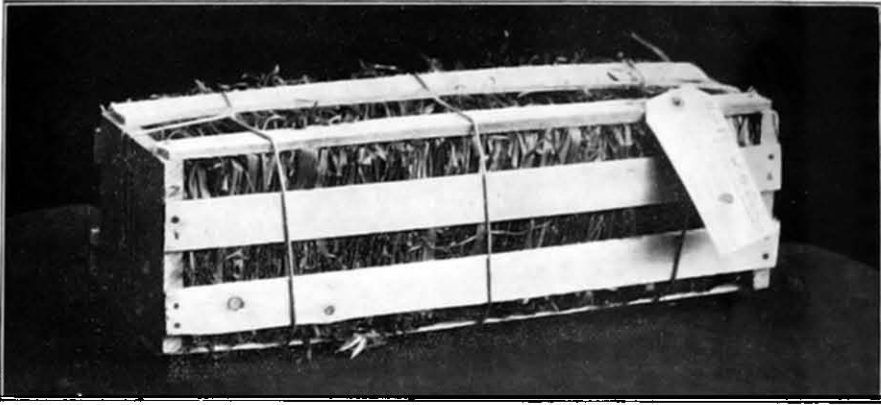


FIG. 49.—SECTIONS PACKED FOR FORWARDING BY PARCEL POST.

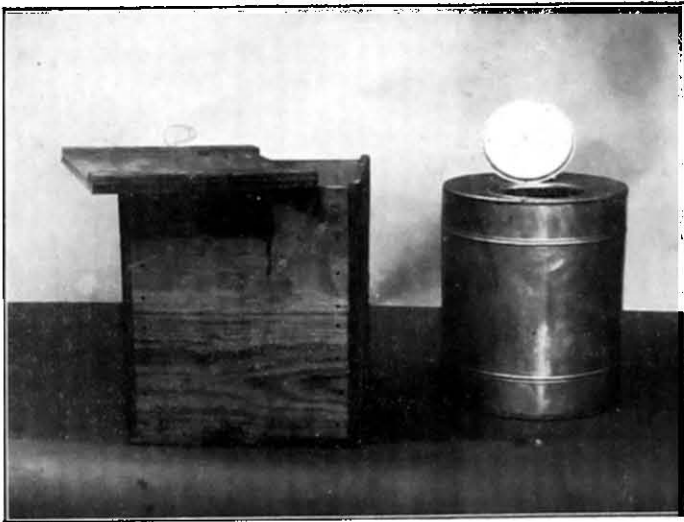


FIG. 50.—TIN FOR EXTRACTED HONEY, AND CASE FOR HOLDING TIN WHEN FORWARDED BY RAIL.

XXII. CHILLED BROOD AND FOUL BROOD.

Chilled brood, that is to say, brood which has been killed by cold, may be produced by any cause which results

164. Chilled Brood. in the temperature of any portion of the brood nest being too low. It may be the result of injudicious brood spreading, want of covering, insufficient nurses, exposing frames of brood to cold winds, specially in the early spring, driving bees off brood frames by the injudicious use of disinfectants under particular frames, adding frames of brood to weak stocks that have not bees enough to cover the brood, leaving the floor board ventilator open when the weather is too cold to justify doing so, putting on more super rates than the stock is capable of dealing with, sudden and extreme changes of the weather from heat to cold, or by any other means suddenly reducing the temperature of the brood nest too much. Chilled brood, which is sometimes mistaken for foul brood, differs from the latter in the following respects. The odours peculiar to foul brood are absent. If the capping of cells containing chilled brood is removed during the breeding season, the dead bees will be found in natural positions, slightly shrunken, black at the head in early stages, and finally becoming black all over. The larvæ turn greyish at first, and afterwards become almost black. Chilled larvæ are not often met with in a strong stock, as the bees will rapidly remove them; a strong stock requiring room will rapidly remove chilled brood from cells which have been uncapped, whereas they will not usually under similar circumstances remove diseased brood affected by foul brood.

A diseased condition known as "Pickled Brood" is frequently mistaken for "Foul Brood" or "Chilled Brood," from which it may be distinguished by the following characteristics: if the larva of pickled brood is pulled out of its cell by a pin or match, it has rather the appearance of liquid matter, and if the brood in a capped cell is similarly withdrawn the abdomen will be found to contain liquid matter, and the head will probably be dark brown in colour as distinguishable from the almost black colour of "chilled" brood; there is further a total absence of the stickiness and peculiar gluey odour which is characteristic of American foul brood.

is provided by the Bee Pest Prevention (Ireland) Act, 1908, that "if any person keeping or having

165. Foul Brood. charge of bees becomes aware that the bees, or any of them, are affected with the disease known as Bee Pest or Foul Brood, he shall forthwith give notice of that fact to the Local Authority of the district in which the bees are kept; such notice should be given in writing to the Executive Officer of the Local Authority, *i.e.*, the Secretary of the County Committee of Agriculture."

Foul brood is by far the worst disease to which bees are subject in this country. It is extremely infectious, and because

of the readiness with which it can be transmitted from infected to healthy stocks, it is very destructive, and it behoves bee-keepers to exercise the greatest vigilance in order to keep their apiaries free from it.

The term "Foul Brood" is applied to more than one disease of bees. In Ireland it nearly always refers to one of two forms of disease, both of which are very prevalent throughout the country. These are commonly known as "European Foul Brood," *Bacillus alvei* (*hive bacillus*); and "American Foul Brood," the *Bacillus larvæ* of Franklin White.

If a stock becomes affected by foul brood, and prompt and effective measures are not taken to check the progress of the disease, the infection will almost certainly spread to the remaining stocks of the apiary, and if unchecked will lead to their ruin. It is therefore most important that efficient measures should be adopted to prevent its introduction, or to secure its eradication wherever it has appeared.

A bee-keeper who knows or suspects that foul brood exists in his apiary, should avoid entering any other healthy apiary.

The commonest causes of foul brood infection are:—

- | | |
|----------------------------|--|
| | Healthy stocks robbing diseased stocks. |
| 166. Sources of Infection. | The supply to bees of honey or combs from a diseased hive. |
| | The transfer of frames from a diseased to a healthy hive. |

Neglect on the part of the operator, after handling a diseased stock, to thoroughly disinfect his hands and clothing or such appliances as may have been infected.

The acquisition of infected swarms or stocks.

Experience proves that the following conditions are specially conducive to the development of the disease:—

- | | |
|---|---|
| 167. Conditions favourable to Foul Brood. | Damp and closely sheltered situations, especially where the hives are much overshadowed by trees. |
|---|---|

Dirty hives.

Badly ventilated hives.

Hives which are not weather-proof.

Weak stocks.

A frame of brood in a healthy hive has, near its centre, a more or less circular patch of brood. In the

168. Symptoms. cells constituting this brood patch there will be found small grubs or larvæ, the best developed of which present a plump pearly-white appearance, as they lie curled up in the shape of the letter "C" at the bottom of the cells; but when the disease is present, particularly in its more advanced stages, these larvæ will frequently be noticed lying in various other positions, often with their backs up. In the "capped" stage, the capping of healthy brood is usually flat, or very slightly raised, rarely sunken; whereas the capping

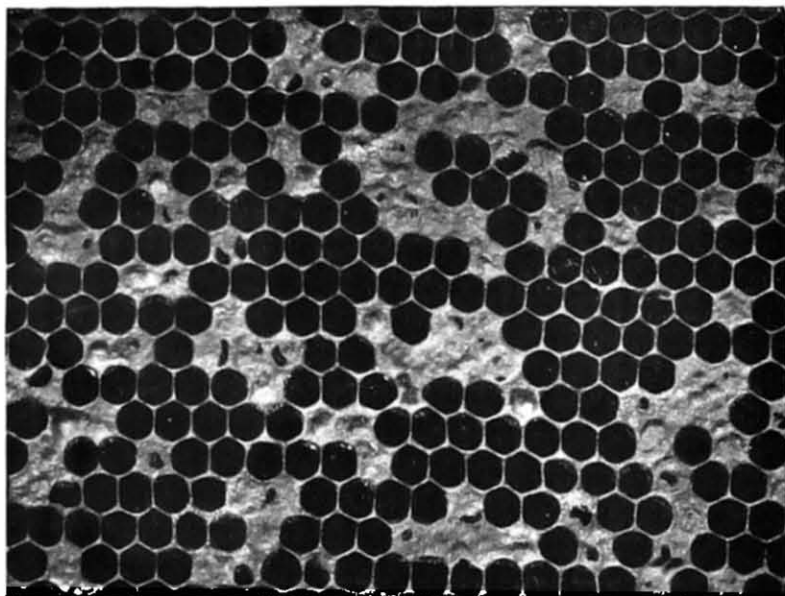


FIG. 51.

1. Portion of a comb affected by foul brood in an advanced stage. The empty cells are those from which healthy brood has been produced, or which have been occupied by diseased larvæ, the remains of which are not discernible in the print. All the capped cells bear the appearance of being diseased. This is indicated by the sunken cappings of the cells, and the numerous perforations in the cappings.

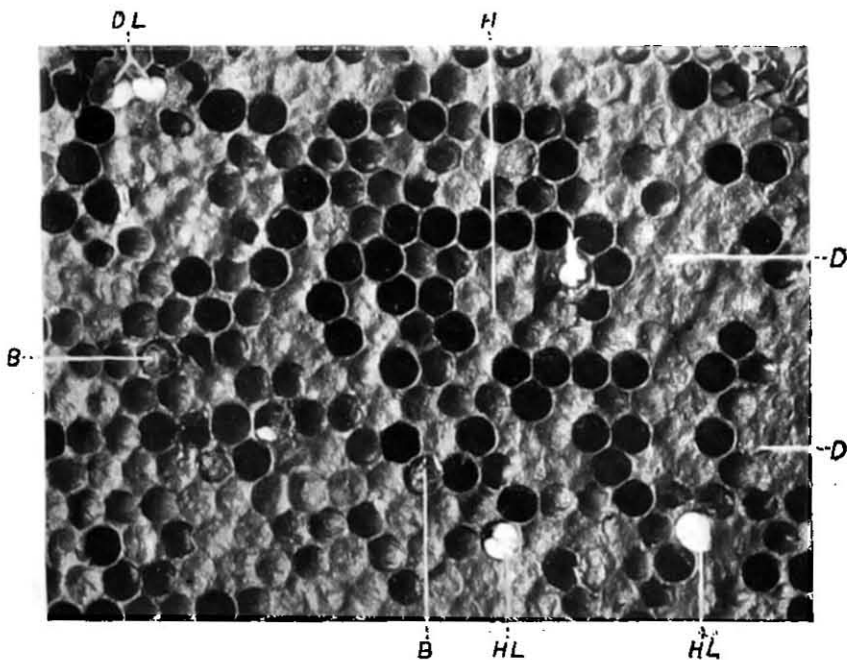


FIG 52

2. Portion of comb affected by foul brood, in a less advanced stage than "1." The raised cappings indicate that there is a good deal of healthy brood, but the presence of diseased brood all over the comb is indicated by the sunken cappings.
 H.—A group of healthy cells; other healthy cells being observable all over the comb.
 D.—Two groups of diseased cells, of which there are many more.
 B.—Healthy bees emerging from their cells.
 HL.—Healthy larvæ.
 DL.—Diseased larvæ. Note that these larvæ are not lying like the healthy larvæ.

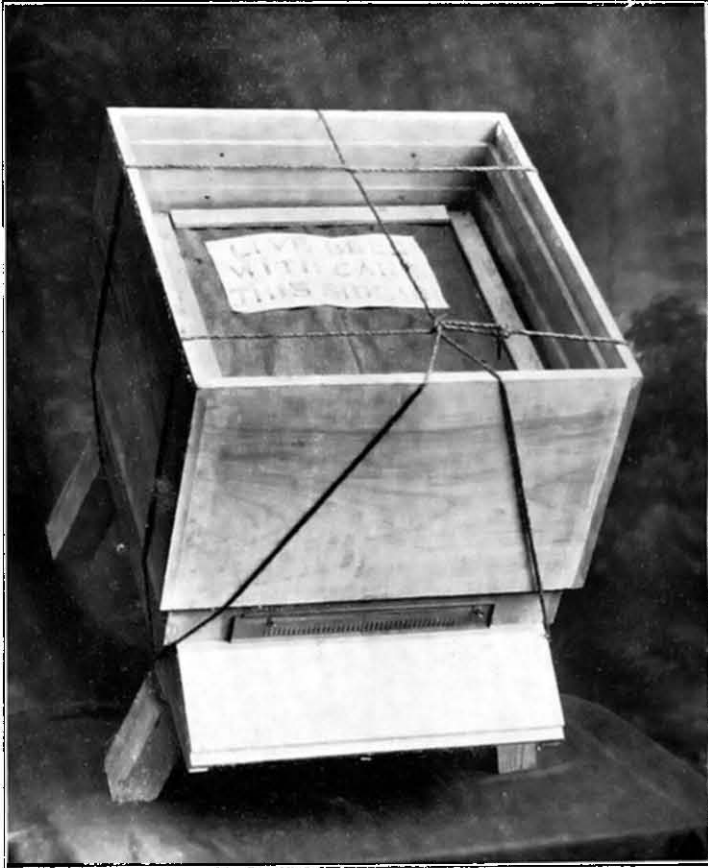


FIG. 53.—HIVE CONTAINING COMBS AND BEES, SECURED FOR FORWARDING BY RAIL.

Note laths fixed to body-box by screws thus confining frames under canvas cover in position: the hive is so roped that even if the alighting-board is broken in transit, the rope fastenings remain tight and secure.

of diseased brood is usually indented, often perforated, and generally darker in colour than that of healthy brood (Figs. 51 and 52).

Some other readily recognisable symptoms vary somewhat in the "European" and "American" types of disease; they are as follows:—

<i>European.</i>	<i>American.</i>
Mainly affects unsealed brood.	Mainly affects sealed brood.
Larvæ when first affected generally have a yellow spot on the body, near the head.	Dead larvæ are first of a light coffee colour which gradually deepens.
Dead larvæ are first cream colour, then yellowish, then brownish, and finally almost black.	The cell contents become a sticky mass in which the grub is not distinguishable. If a wooden match is inserted into this gluey mass, and then withdrawn, the stickiness of the adhering matter will permit of its being drawn out for $\frac{1}{2}$ inch, 1 inch, or more, before it breaks off.
The cell contents do not become sticky, or but slightly so; they are rather watery; and the dead grub gradually shrivels up.	The odour is heavy and foetid, rather resembling that of glue. This gluey odour is a marked symptom.
The odour in early stages is sourish, but in later stages becomes heavier and more foetid, but the markedly gluey odour of American foul brood is absent.	

For Instructions as to treatment, read Leaflet No. 48 (revised), issued by the Department of Agriculture and Technical Instruction for Ireland.

XXIII. ARTIFICIAL SWARMING.

Under certain conditions artificial swarming may be practised with advantage by experienced bee-keepers.

169. Artificial Swarming.

If it is desired to increase the stocks in the apiary or to provide swarms for sale, the bee-keeper may select the most suitable stocks for the purpose, and, subject to their being in fit condition for artificial swarming, may select the most convenient time for that operation. If a stock shows that it is in fit condition for swarming and is going to swarm (92), and that an increase of stock is desired, but that swarming is prevented by unfavourable weather, an artificial swarm may advantageously be made, as the bees will then settle down steadily to work, and valuable time will be gained, and the possible loss of the swarm may thus

be obviated. Artificial swarms should not be taken except when the stock is strong enough to cause the bees to be crowded on at least nine frames, and when drones are present. The existence of queen cells containing brood or larvæ is a sure sign that the stock is strong enough to permit of an artificial swarm being taken. If the swarm is to be sold it may be taken off under any conditions of weather which permit of the hive being opened without injury to the stock, but if the swarm is to be made in order to increase the number of stocks in the apiary, it should only be taken when honey is coming in freely, though an artificial swarm may be taken with safety in weather which is not fine enough to induce bees to swarm naturally. Artificial swarming should only be attempted by bee-keepers who are thoroughly conversant with the conditions which indicate that a stock is in a fit condition for taking an artificial swarm from it; much harm may be done by making artificial swarms when the conditions are not suitable for doing so; it should never be practised for the purpose of increasing the number of stocks in an apiary in which foul brood (165) is believed to exist.

Artificial swarming may be performed at any time of day subject to the conditions above stated (169). To

170. Making an Artificial Swarm for Sale, from one Stock. do so, remove the stock hive to a position immediately adjacent to, but on one side of, its stand; ascertain and note the weight of the swarm-box (56) in which the bees are to be placed for despatch, then, if the stand is of concrete, place the swarm-box on it in inverted position, with its front edge resting on a small stone, thus raising the front of the box so as to permit the bees to run into it; if the stand is not concrete, place a board on the stand and invert the swarm-box on it as above described; then place a hiving-board in position somewhat as for hiving a swarm (76), letting it rest against the stand or board on which the swarm-box has been placed; uncover the stock hive, lift the frames out in succession, beginning at the back, and shake or brush the bees off the frames on to the hiving-board from which they will move into the swarm-box: replace each frame in the stock hive after it has been cleared of bees: while this is being done, a sharp look-out must be kept for the queen, as she must be transferred with the bees to the hiving-board; about three to three and a half pounds of bees is as much as can usually be taken artificially from a stock without risk of chilling the brood; therefore, an artificial swarm is usually lighter than a strong natural swarm, but as the bees of a natural swarm have stored their sacs with honey, each pound in weight of an artificial swarm will contain many more bees than would a similar weight of a natural swarm (11). The weight of the swarm may be easily ascertained by weighing the swarm-box when empty and again when the bees are in it; when sufficient bees have been thus transferred with the queen, cover the swarm-box, replace the stock hive, remove the two outside

frames and a third if advisable, and supply extra covering to make up for the loss of heat due to the removal of bees.

To make an artificial swarm from one stock, for the purpose of increasing the number of stocks in the apiary, during the forenoon of a fine day, when the bees are working vigorously, remove the stock hive as above described (170) to a position at one side of its stand, then place on the stand a hive containing three or four frames of foundation,

171. Making an Artificial Swarm for Increase, from one Stock.

or two frames of empty comb and one or two of foundation; then transfer to this hive from the stock hive one frame of honey and one frame of brood, taking care that the queen is transferred on one of these frames; place the brood frame in the centre and the honey frame at the back, then move the parent hive to a fresh stand, if possible not less than about ten yards from its old stand, and there let it remain. The flying bees will enter the new hive which has been placed on the old stand, and will thus form an artificial swarm. It would be a great advantage to the parent stock if after the removal of a swarm with queen by either of the methods described, a laying queen could be introduced into it (152).

If it is desired to make a swarm for increase from two stocks, let it be assumed that the swarm is to be made up from hives A and B. Remove B to a fresh position, if possible at least ten yards from its old stand; place an empty hive C beside A, and transfer from

172. Making a Swarm for Increase, from two Stocks.

A to C, say five frames of brood, first shaking or brushing the bees off into A; then place C on the stand vacated by B; if a fertile queen is available she should be introduced (153) to stock C, and a frame of foundation should also be given; if a queen is not available for C, the operator should make sure that there is a capped queen cell or one containing larva on one of the frames transferred from A to C, and if necessary the operation of making a swarm should be deferred until a frame with a queen cell is available. Each stock should then be warmly covered, a frame of foundation being first added to A.

XXIV. RECIPES.

When the term "sugar" is used in the following recipes, it is to be understood as signifying white lump

173. Sugar.

refined sugar. Beet sugar is considered by many good authorities to be injurious to bees, and brown or moist sugars are said to produce dysentery, therefore, bee-keepers are advised to use the purest white lump cane sugar obtainable, such as Tate's No. 1 lump, Tate's crystals, or Fairie's crystals.

To make soft candy, use an enamelled iron saucepan or pan, into which put one pint of water and about

174. Soft Candy. six lbs. of sugar, stir over a slow fire until the sugar is melted, then add one teaspoonful of cream of tartar, and let the whole boil; then stop stirring, and let the mixture continue to boil, say for three to four minutes, until the proper consistency is obtained, to ascertain which, drop a little of the mixture from a spoon on a plate; if the substance withdrawn can be kneaded into a pill without sticking to the fingers, the condition is right; if it is sticky, continue the boiling as long as necessary. When the proper condition has been attained, remove the pot from the fire and place it in cold water to cool; while cooling, stir or whip the mixture against the sides of the pot until it assumes the consistency of a white paste; then turn it out on paper laid in suitable moulds, such as a plate. In half an hour it will be cool enough to place in the hive.

To make flour candy, proceed as in recipe 174, but after taking the pot off the fire and before cooling the

175. Flour Candy. mixture, stir in about $\frac{1}{2}$ lb. to $\frac{3}{4}$ lb. of pea flour, or if it cannot be obtained wheat flour may be substituted; the flour should be slowly added from a sifter while the mixture is very hot, the whole being vigorously stirred at the same time.

To make medicated candy, proceed as directed in recipes 174 and 175, but when the mixture is taken

176. Medicated Candy off the fire, add one teaspoonful of naphthal beta solution for every two pounds of sugar used, stirring it well through the mixture.

To make naphthal beta solution, procure an eight-ounce glass bottle, marked in fluid ounces. Put one

177. Naphthal Beta Solution. ounce of naphthal beta powder, costing about one shilling, into the bottle, which should then be half filled with methylated spirit, then shake well until the powder is thoroughly dissolved, after which add more methylated spirit until the liquid reaches the seven-ounce mark. It is then ready for use.

	Water,	.	.	.	1 quart,
178. Spring and	Sugar,	.	.	.	8 pounds,
Summer Syrup.	Vinegar,	.	.	.	1 tablespoonful,
	Salt,	.	.	.	1 teaspoonful.

Simmer and stir over a slow fire until thoroughly melted, and use at blood warmth.

	Water,	.	.	.	1 quart,
179. Autumn Syrup.	Sugar,	.	.	.	5 pounds,
	Vinegar,	.	.	.	1 tablespoonful,
	Salt,	.	.	.	1 teaspoonful.

Simmer and stir over a slow fire until thoroughly melted, and use at blood warmth. To prevent the sugar crystallizing, half a teaspoonful of cream of tartar may be added. If it is desired

to medicate either the summer or autumn syrup, add one half fluid ounce (181) of naphthal beta solution or 30 grains of paraform powder to recipes given (178), (179).

180. Subduing Solution.	Water,	1 pint,
	Calvert's No. 5 carbolic acid,	1 ounce.
	Izal,	$\frac{1}{2}$ ounce.

Mix in a bottle. Shake thoroughly before use.

APOTHECARIES WEIGHT.

181. Weights and Measures.	20 grains	= 1 scruple.
	8 scruples	= 1 dram.
	8 drams	= 1 ounce.

LIQUID MEASURES.

60 minims	= 1 fluid drachm.
8 drachms	= 1 ounce.
20 ounces	= 1 pint, = 4 gills.
1 minim	= 1 drop.
1 drachm	= approximately 1 teaspoonful.
2 drachms	= do. 1 dessertspoonful.
4 drachms	= do. 1 tablespoonful.
2 ounces	= do. 1 wineglassful.
8 to 10 ounces	= do. 1 tumblerful.
1 gill	= 5 ounces avoirdupois of water.

XXV. MOVING HIVES.

When it is necessary to alter the position of a hive in an apiary to a greater distance than two or three yards from its old stand, the movement can be most conveniently carried out during the winter and early spring; during this period the bees only leave the hive for short flights, and it may be moved as requisite after sunset, the whole move being made in one operation. If, as is often the case, it is necessary to move a hive during other portions of the year, when bees may be flying freely, the hive must not be moved more than four feet per day when there are no other immediately adjacent hives, nor more than two feet per day when there are other hives close to the hive which is to be moved; in either case the hives must not be moved on days during which the bees did not fly, and the movement should always be carried out after the bees have ceased flying for the day. When about to move stocks as above mentioned, take care before doing so to see that a firm level stand is provided on which to place the hive when moved, so that it shall remain level (69); if necessary place flat stones or slates under each leg of the hive; the hive should be lifted very gently by two people, who should grip it under the floor-board.

If it is necessary to move a stock in a bar-framed hive in the summer, say from May to September inclusive, it is advisable to obtain the advice and assistance of a bee-keeper who has had

experience in packing bees for transit at such times, as owing to the special conditions which then prevail, disaster is likely to ensue if skill and sound judgment is not exercised in packing.

If it is necessary to move a hive for such a distance that it cannot conveniently be moved slowly, two to four feet per day as above described

**183. Moving Stocks
in Hives a con-
siderable distance.**

(182) the move may be made in one operation, provided that it takes place in the winter or before the bees have begun to gather pollen; but if, as will often be the case, the move must be made during the remaining period of the year, when the bees are much afield, then the hive should be moved to a position at least two miles in a direct line from where it stands, and preferably rather farther, and as in the previous case, the move should be made after the bees have ceased flying for the day. It sometimes may occur that owing to the intervention of a river, wall, or other obstacle, it may not be possible to move a hive to a fresh stand close at hand at the rate of two to four feet per day; in such cases the hive should be moved to a spot more than two miles from its original stand, and after it has remained in the new position for a month or more, it may be transferred to its final position. This method of moving may have to be adopted when uniting stocks (133).

Hives containing stocks of bees should not be forwarded long distances by road or rail during the months from May to August, inclusive, unless there is urgent reason for doing so; but they may be moved with safety at any other time, except when the weather is exceptionally cold. The best time for moving hives containing stocks is in April and the early part of May.

When it is desired to forward a hive containing bees by road or rail, the hive must not be moved until after bees have ceased flying in the evening, but all necessary preparations, except closing the entrance, may be made earlier in the day, giving the bees sufficient time to settle after disturbance. The hive should be prepared for moving as follows:—

**184. Securing a Bar-
frame Hive
containing Stock for
Transport by Road
or Rail.**

Subdue the bees (65); remove the body-box from off the floor-board; tack to the floor-board two lengths of hay rope of about one inch diameter, these being placed parallel to one another and about three inches from each side of the floor-board; these ropes must not project under the body-box in front nor under the dummy when it is in position; if the hive is not fitted with a Swiss or similar metal entrance (21) affording ample ventilation, perforated zinc should be used to cover the entrance, and if the ventilating space thus provided is but small, a floor ventilator, say four inches square, should be cut in the floor-board and covered on its upper side by perforated zinc; replace the body-box; remove from the brood nest frames containing honey only, and place them behind the dummy, and, if space admits, substitute for them one or two frames of

empty drawn comb ; any frame the comb in which is not firmly attached at the top and sides, should be secured by passing strips of broad tape or calico under the bottom bar of the frame, and tying them over the top bar ; treat frames containing new comb similarly ; in hot weather it is best to send about half of the bees with the queen in a swarm box (56), thus leaving in the hive sufficient bees to nurse the brood ; press the dummy and all frames both before and behind it tightly to the front and wedge them in position, so that they cannot shift backwards ; spread a cover of sacking of open texture about 20 inches by 20 inches over all, so that it shall project over the body-box all round ; place two laths, each of exactly the internal lengths of the body-box, over the sacking, so that they shall lie immediately over the shoulders of the frames on either side, and tack or screw the laths down to the front and back sides of the body-box, so that they shall keep the frames in position during transit ; then further secure the sacking cover by tacking over it a slip of wood, at the front and back ; place the lift over the body-box, inverted as for winter ; it will thus securely bind the canvas cover ; screw or nail the floor-board to the body-box with one screw or nail on each side ; tie the body-box firmly to the floor-board with rope, so securing it that if the alighting board breaks in transit, the ropes round the body-box will not slacken (Fig. 53) ; the roof and any spare fittings should be packed as a separate parcel ; after the bees have returned and settled down in the evening, securely close the entrance ; this may be done by tacking perforated zinc over the entrance, or if a Swiss entrance (21) is fitted, by closing the doors tightly, and tacking them to prevent them from opening. The hive, if to be sent by train, should be labelled "LIVE BEES, WITH CARE, THIS SIDE UP."

An excellent alternative method of packing is to act as above described until the frames have been wedged in position ; then, instead of securing the frames by laths over canvas, tack a lath over the centre of the top of a section crate, then cut a piece of open texture sacking large enough to permit of its being drawn neatly over the crate and tacked securely to the crate sides all round, so that no bee could escape under it ; then place the crate over the frames and secure it in position with screws or wire nails, so that no bees can escape ; this method of packing provides ample space in the crate for the bees, and makes suitable provision against risks of over-heating, or chilling of brood : it is therefore probably the safest method for an inexperienced person to adopt when the weather is warm.

To secure a stock in a skep for transit by rail or road : if the skep is not fitted with wooden skewers running through the combs, they should be inserted ; it is best that this should be done at least two days before the skep is to be removed. To fit the skewers, subdue (82), invert the skep, and then drive a couple of sharply-pointed wooden skewers through the sides of the skep and

185. Securing a
Fixed-comb Hive
containing Stock
for Transport by
Road or Rail.

across the intervening combs, inserting them at about four inches from the rim of the skep, and at about four inches apart; the operator should support each comb with his hand or with a piece of wood when the skewer is being forced through it, to prevent the comb being bent out of place or broken, and for the same reason the skewers should be forced through by a slight screwing motion of the hand: the bees will quickly attach the combs to the skewers, but it is best to give them at least two days to do so. When the time has arrived for moving the skep, subdue (82), invert the skep, cover its mouth with sacking of open texture which should then be firmly secured to the outside of the skep, to prevent the escape of bees: then place the inverted skep in a crate or box, and tie or fix it therein in such manner that it may rest securely in inverted position: the sides of the crate or box should project slightly above the skep so that a strong lath may be nailed across the top of the box to protect the skep.

If the stock to be moved is in a box or wooden hive: instead of using skewers, cut two pieces of roughish wood, just long enough to fit neatly across the hive internally, and about one inch square; subdue (82) the bees, invert the hive, and press the two sticks down across and into the combs, just sufficiently to permit of the combs being attached to the cross-stick by the bees; the sticks should be placed across the combs, about four inches apart, and pressed down about $\frac{1}{4}$ inch into each comb.

If it is desired to move the stock in warm weather, say in the period from June to August inclusive, about half the bees with the queen should be driven and placed in a swarm box as described in paragraph 184.

A fixed comb hive should always be kept inverted during transit, as this position facilitates ventilation, and lessens the risk of breaking combs, as the heaviest portions of comb containing honey are those nearest to the roof or crown of the hive.

XXVI. SPRING CLEANING.

Advantage should be taken of a suitable opportunity during the forenoon of a fine mild day in spring, before supers are put on, to transfer each stock from the hive in which it has been wintered, to a clean hive. Care should be taken not to expose the brood more than is necessary. Having prepared a clean hive to take the frames from the old one (75), remove the old hive to a position next its stand, place the clean hive on the stand, subdue the bees (65), scrape all propolis off the top bars of the frames, smear the frame shoulders (75), and then transfer them to the clean hive, placing them in it in the same order in which they hung in the old hive: after which cover up. The old hive should then be thoroughly cleaned, washed out with an emulsion of one ounce of Izal to one gallon of hot water, or a solution of $2\frac{1}{2}$ lbs. of washing soda (soda crystals) dissolved in one gallon of boiling water, or other dis-

186. Spring
Cleaning.

infectant solution, and it should then, if necessary, be painted and left ready for use. Bees do not object to the smell of IZAL. If a spare hive is not available, the frames may be hung in a suitable box, taking care to provide an exit hole and to cover them warmly; in this they may be left while the old hive is being scraped and cleaned, after which they should be returned to their hive. This operation need not be carried out in the case of stocks which it is intended to work for extracting, if the instructions already given (120) are followed.

INDEX.

	PAGE
Advantages of bar-frame hives, (18)	11
Age of brood, (10)	9
" queen, (6)	7
Ants, protection of hive from, (69)	27
Apiary, site of, (68)	26
" arrangement of, (68)	26
Appliance-box, (47)	19
Appliances for driving, (81)	32
" for commencing bee-keeping, (58)	22
Artificial swarming, (169 to 172)	73-75
Autumn feeding, (104)	42
Bar-frame, (24)	13
Bar-frame hive, (18)	11
Bee, queen, (6)	7
" worker, (7)	7
" drone, (8)	8
" escape, cone, (23, 42),	13, 18
" " Porter, (41),	17
" " Federation, (41)	17
Bee-keeping, commencing, (67)	26
" requisites for commencing (58)	22
" works on, (1)	5
" profits of, (3)	6
Bees, races of, (5a)	6
" range of flight of, (15)	10
" handling, (62)	23
" uniting, (132 to 137)	59-61
" subduing, (63)	24
" driving, (81, 84)	32, 33
" transferring from fixed-comb hive to bar-frame hive, (86, 87)	34
" weight of, (11)	9
Beeswax, extracting, (138, 139)	61
Board, hiving, (54)	21
" embedding (36),	16
" extension, (95, 110)	38, 45
Body-box, (21)	12
Box, appliance, (47)	19
" swarm, (56)	21
" for sending queen by post, (154)	68
" for frames, (53)	20
Brood (10),	9
" age of, (10)	9
" chamber, (21)	12
" spreading, reasons for, (88)	35
" " time for, (89)	35
" " method of, (90)	36
" chilled, (164)	71
" foul, (165)	71
" pickled, (164)	71
Cage, queen, (55)	21
Caging queen, (151)	66
Candy, soft, (174)	76

	PAGE
Candy, flour, (175)	76
" medicated, (176)	76
Capping cells, (17, 126)	11, 57
Cast, description of, (12)	10
Casts, prevention of, (13, 95, 96, 100)	10, 38, 39, 40
" treatment of, (13, 100)	10, 40
Cells, (9)	8
Cleaning hive in spring, (186)	80
" extractor, (124)	54
Cloth, subduing, (43)	18
Comb, (9)	8
" foundation, (32)	15
" transferring from fixed-comb hive to bar-frame hive, (85)	33
Cone bee-escape, (42)	18
Corkdust, cover, (129)	57
Coverings for brood chamber, (26, 129)	14, 57
Crate, economic section, (29)	14
" divisional section, (30)	15
Crates, packing section, (111, 117)	46, 50
" preparing section, (109, 115)	45, 49
" tiering, (111)	46
" removing, (112)	48
Damp situation unsuitable for apiary, (88, 167)	26, 72
Definitions, (5)	6
Diseases, (164-168)	71-73
Division-board, (25)	13
Divisional crate, (30, 115, 116)	15, 49, 50
Doubling-box, (31)	15
" " placing, (120)	52
Doors, (21)	12
Drone bee, (8)	8
" cell, (9)	8
Driving appliances, (81)	32
" from a skep, open, (82)	32
" " " close, (83)	33
" from a box, (84)	33
Dummy, (25)	13
" to fit for feeding, (103)	42
Dusting bees with flour, (132)	59
Dwindling of stocks in summer, (103)	41
Economic section-crate, (29)	14
" " filling, (109)	45
Eggs, (6, 7, 10)	7, 9
" time when young queen will lay, (14)	10
" laying, (6, 7)	7
Embedder, (37)	16
Embedding appliances, (35)	16
" board, (36)	16
" foundation, (74)	29
Escapes, cone bee, (23)	18
" Porter, (41)	17
" Federation, (41)	17
Excluder, queen, (48)	19
Extension Board, (95)	38
Extracted frames, treatment of, (122, 123, 124)	53, 54
" honey, grading and storing, (157)	69
" " sending by rail, (163)	70
Extracting, (124)	54

	PAGE
Extracting <i>versus</i> sections, (118)	50
" wax, (138, 139)	61
" preparing stocks for, (119)	51
" treatment of swarm issuing from hive supered for, (98).	40
" treatment of swarm issuing from hive which it is intended to work for, (99)	40
" treatment of stocks worked for, (121)	53
" removal of frames for, (122)	53
Extractor, (49)	20
" cleaning, (124)	56
Feather, use of subduing, (64)	24
Feeder, (38)	16
" cheap pattern for slow feeding, (39)	17
" " " " quick feeding, (40)	17
" method of using, (102-104, 106)	41-44
" round tin (38)	16
Feeding, reasons for, (101)	41
" indications of want of, (103, 105, 125-127)	41, 43, 56, 57
" spring stimulative, (106)	43
" summer, (103, 112)	41, 48
" autumn, (104, 125-127)	42, 56, 57
" winter, (105, 126-127)	43, 57
" by means of sections, (103)	42
" passage in winter, (129)	57
Fertile worker, (7)	7
Fixed-comb hive, preparing stock for transfer from, (86)	34
" " " transferring bees and comb from, (85)	33
" " " " only from, (87)	34
" " " uniting two stocks that are in, (136)	60
Filling section crates, (109, 115)	45, 49
Flight of bees, range of, (15)	10
Flightboard, (20)	12
Floorboard, (20)	12
Flouring bees, (132)	59
Flowers producing honey, (4)	6
Follower, (29)	14
Food, signs that food is wanted, (103)	41
Foul Brood, (165)	71
" sources of infection, (166)	72
" conditions favourable to development, (167)	72
" symptoms, (168)	72
Foundation, comb, (32)	15
" frame, (33)	16
" section, (34)	16
" fixing in frame, (73)	28
" " " section, (109, 115)	45, 49
" embedding, (74)	29
Frame, Abbott, (24)	13
Frame-box, (53)	20
" standard, (24)	13
Frames, wiring, (71, 72)	27, 28
Handling bees, (62)	23
Hive, C.D.B., (19)	12
" stand, (69)	26
" preparing for swarm, (75)	29
" securing for winter, (130)	58
" securing bar-frame hive with stock for transport by rail or road, (184).	78

	PAGE
Hive, nucleus, (57)	22
Hives, moving, (15, 182-184)	10, 77, 78
" location and arrangement of, (68)	26
" bar-frame, (18)	11
Hiving-board, (54)	21
" swarm through hive entrance, (76)	30
" queen lost, when, (77)	31
" examination of hive after hiving swarm, (78)	31
" treatment of stock after hiving swarm, (79)	31
" swarm by casting into brood chamber, (80)	31
Honey, supply, (4)	6
" flow, signs of, (16)	11
" ripening of, (17, 124)	11, 55
" producing honey for sale, (107)	44
" flow ceasing when supers are on, (112)	49
" uncapped, unsuitable for winter food, (126)	57
" storing, grading, and marketing, (156-163)	68-70
" sending by post, (161)	70
" rail, (162, 163)	70
Honeycomb, (9)	8
Inbreeding objectionable, (146)	64
Increasing stocks by artificial swarming, (169-172)	73-75
Introducing queen by cage, (152)	66
" direct, (153)	67
Italian bees, as honey gatherers, (5a, 119)	6, 51
Knife, uncapping, (52)	20
Lace paper for sections, (160)	69
Larva, (10)	9
Laying power of queen, (6, 144)	7, 63
Lift, (22)	13
" second, (111)	47
Life of worker, (7)	7
Marketing honey, (161)	70
Manipulating stocks, (62)	23
" position of operator when, (61)	23
Measures and weights, (181)	77
Medicated candy, (176)	76
" syrup, (179)	76
Moving hives, (15, 182 to 184)	10, 77, 78
Naphthol beta solution, (177)	76
Nucleus hive, (57)	22
Nuclei, forming, (148, 149)	65
" management of, (150)	66
Operator, proper position of, (61)	23
Packing honey for transit, (161-163)	70
" bar-frame hive with stock for transit by road or rail, (184)	78
" fixed-comb hive for transit, (185)	79
Paper for covering sections, (158-160)	69
Parcel post crate, (161)	70
Passage for winter feeding, (129)	57
Personal supervision essential, (2)	5
Pollen, substitutes for, (106)	43
Porch, (21)	12
Porter bee-escape, (41)	17

	Page
Post, sending queen by, (154)	68
Preparing stocks for winter, (125)	56
Prevention of swarming, (13, 88, 95-100, 118)	10, 35, 38-40, 50
" robbing, (143)	62
" foul brood (166, 167)	72
Profits of bee-keeping, (3)	6
Queen bee, (6)	7
" cage, (55)	21
" caging, (151)	66
" catching, (151)	66
" cell, (9)	8
" excluder zinc, (48)	19
" introduction by cage, (152)	66
" " direct, (153)	67
" laying power of, (8, 144)	7, 63
" lost when hiving, (77)	31
" rearing, (144-150, 155)	63-66, 68
" sending by post, (154)	68
" time when young queen will lay eggs, (14)	10
Queenlessness, signs of, (145)	64
Queens, providing, (146)	64
" selecting, (146)	64
" wintering spare, (155)	68
Quilt, (26)	14
" for corkdust, (129)	58
Raiser, (22)	13
Recipes, (173-180)	75-77
Removing section crates, (112)	48
Rendering beeswax, (139)	61
Re-queening, necessity for, (144)	63
Requisites for commencing bee-keeping, (58)	22
Ripener, (50)	20
Ripening honey, (17, 124)	11, 54
Robbing, (123, 140-143)	54, 62
" causes of, (141)	62
" signs of, (142)	62
" prevention of, (143)	62
Roof, (23)	13
Section, (27)	14
" crate, (29, 30)	14, 15
" crates, filling and placing, (109-111, 115, 116)	45-50
" " packing, (110, 117)	46, 50
" " removing, (112)	48
" folding block, (27)	14
" foundation, (34)	16
Sections, feeding by means of, (103, 114)	42, 49
" treatment of uncompleted, (114)	49
" <i>versus</i> extracting, (118)	50
" grading and storing, (156)	68
" covering, (158)	69
" wrapping in wax paper, (159)	69
" glazing, (160)	69
Securing hive for winter, (130)	58
" hives for transit (184, 185)	78, 79
Separator, (28)	14
Signs of robbing, (142)	62
Site of apiary, (68)	26

	PAGE
Skep, open driving from a, (82)	32
„ close driving from a, (83)	33
Sleevelets, (46)	19
Smoker, (44)	18
Soft candy, (174)	76
Solution, subduing, (130)	77
„ naphthol beta, (177)	76
Spring cleaning, (186)	80
„ feeding, (106)	43
Stand, hive, (69)	26
Standard frame, (24)	13
Stings, (59)	23
„ protection from, (60)	23
Stimulating, (106)	43
Stock, definition of, (5)	6
Storing honey, (156, 157)	68, 69
Strainer, (51)	20
Subduing bees, (63 to 66)	24, 25
„ cloth, (43)	18
„ „ use of, (65)	24
Solution, (180)	77
Sugar for feeding, (173)	75
Summer feeding, (103)	41
Super-box (31)	15
Super-clearer, (41)	17
„ „ use of wooden (113)	49
Supering, (107-121)	44-53
„ time to cease, (114, 125)	49, 56
Swarm, (11)	9
„ after, (see Cast)	
„ box, (56)	21
„ preparing hive for, (75)	29
„ hiving through hive entrance, (76)	30
„ examination after hiving, (78)	31
„ treatment of stock after hiving, (79)	31
„ hiving by casting into brood chamber, (80)	31
„ securing, (93)	37
„ identification of hive from which swarm issued, (94)	38
„ treatment of, (95-100)	38-40
Swarming, natural, (11, 91, 92)	9, 37
„ signs of, (11, 92)	9, 37
„ prevention of, (11, 13, 88, 95-100, 118)	10, 35, 38-40, 50
„ artificial, (169 to 172)	74-75
Swarms, uniting two, (132)	59
Swiss entrance, (21)	12
Syrup, spring and summer, (178)	76
„ autumn, (179)	76
„ medicated, (179)	76
Tiering crates, (111)	46
Tins for extracted honey, (163)	70
Transferring comb and bees from fixed-comb hive to bar-frame hive, (85)	33
Transferring bees from fixed-comb hive to bar-frame hive, (87)	34
Transfer, preparing stock for transfer from fixed-comb hive to bar-frame hive, (86)	34
Uncapping-knife, (52)	20
Uncapped honey unsuitable for winter store, (126)	57
Uniting, (131-137)	58-61
„ two swarms (132)	59

	PAGE
Uniting two stocks which are in bar-frame hives, (133)	59
„ swarm to stock in bar-frame hive, (134)	60
„ stock in fixed-comb hive to stock in bar-frame hive, (135)	60
„ two stocks that are in fixed-comb hives, (136)	60
„ , points to be observed when, (137)	61
Veil, (45)	19
Ventilator, floorboard, (20)	12
„ roof, (23)	13
Warmth essential to supers, (117, 120)	50, 52
Wax extracting, (138, 139)	61
„ paper, wrapping sections in, (159)	69
Weights and measures, (181)	77
Wilkes' wire queen excluder, (48)	19
Winter feeding, (105, 125-127)	43, 56, 57
„ preparing stocks for, (125, 129, 130)	56, 57, 58
„ coverings, (129)	57
„ feeding passage, (129)	57
„ securing hive for, (130)	58
Wintering on full hive of frames, (128)	57
„ spare queens, (155)	68
Wiring appliances, (35)	16
„ frames, (71, 72)	27, 28
„ „ reasons for, (70)	27
Worker bee, (7)	7
„ cell, (9)	8
„ fertile, (7)	7
Works on bee-keeping, (1)	5
Wrapping sections in wax paper, (159)	69