OFFICIAL.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

INSTRUCTION

IN

BEE-KEEPING,

FOR THE USE OF

IRISH BEE-KEEPERS.

DUBLIN:
PRINTED FOR HIS MAJESTY'S STATIONERY OFFICE,
BY ALEXANDER THOM & CO (LIMITED), ABBEY-STREET.

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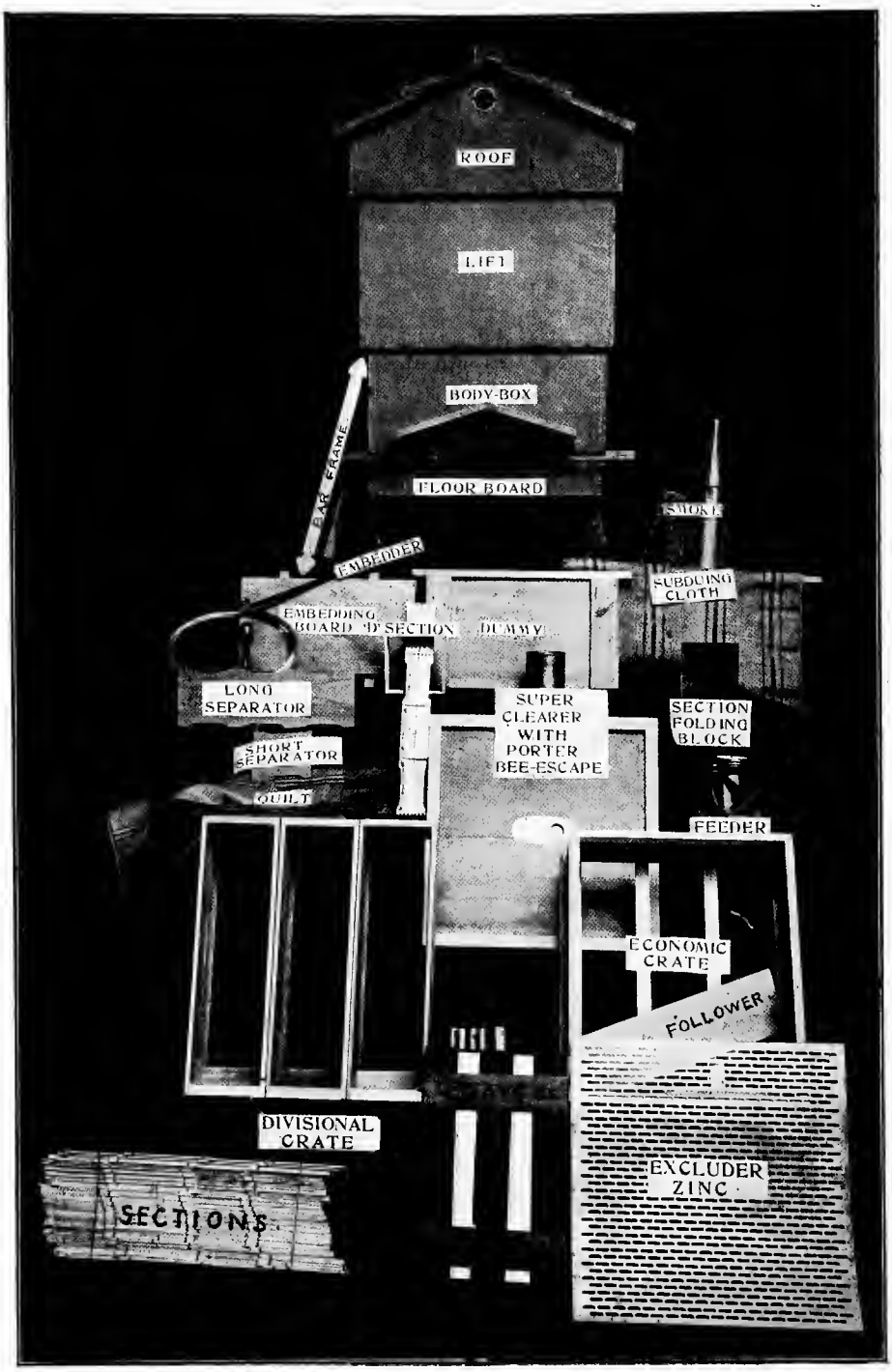

FIG. 1.—A BAR-FRAME HIVE, AND APPLIANCES USED THEREWITH.

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INSTRUCTION IN BEE-KEEPING.

I. INTRODUCTION.

Every one who wishes to keep bees should learn something of their nature, habits, and requirements. The instructions given here 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 :—

1. Works on Bee-keeping.

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

"The Honey Bee: its Natural History, Anatomy, and Physiology," by T. W. Cowan, F.L.S.; published by Houlston & Sons, Paternoster Square, London; price 2*s*. 6*d*.

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

"Bees and Bee-Keeping, Scientific and Practical," 2 vols.; vol. 1, Scientific; vol. 2, Practical; by Frank R. Cheshire, F.L.S.; published by L. Upcott-Gill, 170, Strand, London; price 16*s*.

To all the above works frequent reference has been made for much of the information contained herein, and bee-keepers are strongly advised to study them.

Those who desire to practise queen-rearing, are recommended to read "Queen-Rearing in England," by F. W. L. Sladen; published by Houlston & Sons, London; price 1*s*. 0*d*.

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 paragraphs to which it is desired to direct the reader's attention.

2. Personal supervision essential.

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 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 beekeeping is an industry especially suited to cottagers and small occupiers, who are not likely to be absent from their homes for several days at a time.

3. Profits.

The profits from bee-keeping are large compared with the necessary cash outlay. As a rule, one bar-frame 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 5*d.* per lb., £1 5*s.*, so that, allowing 10*s.* for necessary expenses, the actual profit may be put at 15*s.*, while the first cost of the hive, outfit, and stock of bees is about £2.

II. THE HONEY BEE AND ITS METHODS OF WORKING.

4. Honey Supply.

In most localities the principal flower supply of honey prevails during the months of June, July, and August, as well as 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, those of gorse, blackthorn, gooseberry, and plum being amongst the earliest; in summer, white clover and lime; and in autumn, ling, heather, blackberry, ivy, &c. Districts in which white clover flourishes, are particularly well suited for bee-keeping.

5. Stock.

The term "stock" of bees, when used in these instructions, signifies the living bee population of a hive with its brood.

6. Queen Bee.

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

FIG. 2.—THE HONEY BEE.

(From " Bees and Bee-keeping," by Cheshire).

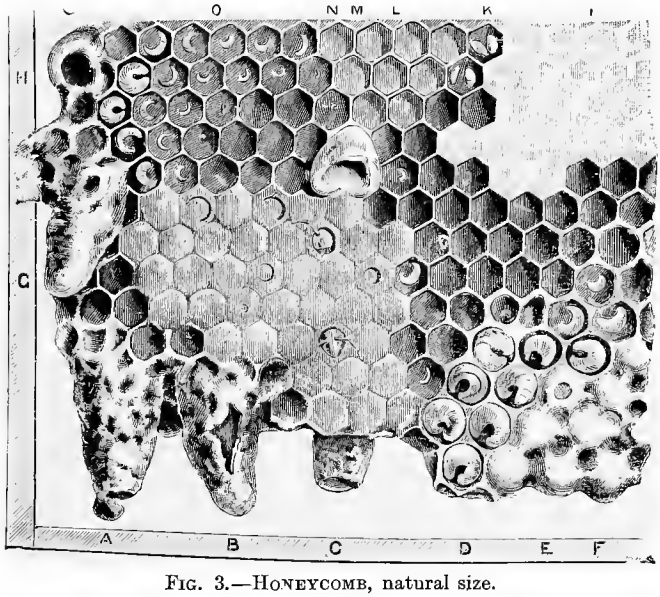

FIG. 3.—HONEYCOMB, natural size.

(From " Bees and Bee-keeping," by Cheshire).

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 grub ; 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.

leaning (**190**), or to ascertain the amount of food present, or or brood spreading (**88**). Great care should be taken when xamining frames at this period, to avoid exposing brood to hills. The virgin queen usually leaves the hive to be mated y the drone (**8**) in from three to five days after her birth; this nating suffices for her life, and on her return to the hive she vill remain in it for good, unless she leaves with a first swarm. An unmated queen will lay eggs that will produce drones nly; a queen must be mated in order that she may lay eggs vhich will produce females, that is to say, workers; the mated ueen has the faculty of determining before she deposits eggs vhether they shall produce males or females; queens are pro- uced from eggs laid by a mated queen in worker cells, but vhich are transferred by the bees from the worker cell to a ueen cell, and thereafter fed upon special food called "Royal elly." Queens are also produced from female larvæ, round vhich the bees build queen cells, the larvæ then being fed on 'Royal Jelly." In a bar-frame hive managed according o modern principles, the queen will, under favourable ircumstances, lay about 2,000 eggs per day, but as the umber of eggs she can lay during her life is limited, a queen aying eggs rapidly in a well-worked bar-frame hive soon xhausts herself, and should not be retained for more than two easons; whereas in the old-fashioned "skep" or straw hive he queen generally laid a very much smaller number of eggs laily, but continued to lay for perhaps four or five years. The ueen begins to lay early in spring if the conditions are favour- able, commencing in the warmest part of the hive, which is sually the centre portions of the centre comb surfaces, on vhich the bees congregate, thereby maintaining a high tem- erature; consequently new frames of comb or foundation hould always be inserted in the centre of the brood nest. When, in early spring, it is noticed that the bees are carrying ellets of pollen to the hive on their legs, it is a sign that the ueen has begun to lay.

7. Worker.

The worker (Fig. 2), like the queen or mother-bee, is a female, but unlike her, has not been cradled in a queen cell nor fed with the special food called "Royal Jelly," and herefore remains through life undeveloped as to the power of aying eggs: if there is neither a queen nor an occupied queen ell in the hive, it sometimes, but rarely in the case of the ommon English bee, occurs that one of the workers lays ggs from which drones only are produced. Such bees, nown as "fertile workers," are most undesirable occupants f a hive; they are rarely found in hives occupied by ueens. All the work of the hive is performed by the orker bees: they make wax, which is secreted from heir bodies, build the cells, fill them with honey which they lone collect, feed and nurse the young brood, collect pro- olis, a resinous substance which they find on trees, and which s used for closing chinks and holes, defend the hive from

enemies, &c., &c., 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. Bees seldom sting after feeding freely ; hence before handling bees they may be quieted by making them feed (**63**). Workers carry honey in the " honey sac," and pollen on their hind legs. Fertile workers are occasionally present in a hive, but their presence is rarely noticed except when it is queenless ; it is then indicated by the manner in which the eggs are deposited, and more markedly by the peculiar appearance of the capped drone cells ; the eggs will appear in groups or patches here and there, instead of being regularly deposited, and several eggs will be found in one cell. The capped cells containing drones produced by a fertile worker present quite a distinct appearance, owing to the eggs having been usually deposited in worker cells, with the result that the cell is specially extended to hold the drone. A fertile worker can only produce drones : she should be got rid of at once : as she cannot be identified, the best course to adopt is to remove the hive fifty yards or more from its stand, then shake or brush all the bees off the frames and out of the hive on to a sheet ; return all frames to the hive, taking care that no bees enter it until it has been replaced on its stand, to which all the bees except the fertile worker will return. As she had probably rarely left the hive, she is unlikely to identify it, and would be killed if she endeavours to enter another hive. The presence of an unmated queen is indicated by precisely similar symptoms ; in her case all that is necessary is to pick her off and destroy her, and re-queen the stock (**153**). Sometimes if a fertile queen in a nucleus hive has not room enough for laying, she will deposit more than one egg in a cell ; or she may act similarly under exceptional conditions in an ordinary hive ; this must not be mistaken for the work of a fertile worker.

8. Drones.

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 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. Their presence in moderate numbers during the summer appears to be necessary for the well-being of the stock. During autumn the workers turn them out of the hive to perish. 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.

9. Comb.

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

10. Brood.

The eggs, larvæ or grubs, and young bees, before they emerge from the cells in which the eggs were laid, are called the "brood." Under normal conditions the egg remains as such for three days, after which the grub or larva appears ("O," Fig. 3). 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. As each grub spins a fresh cocoon in the cell, it follows that when several successive sets of brood have been brought out in the same comb, the capacity of the cells is thereby reduced; many cells also become somewhat choked with pollen. Beekeepers are therefore recommended to avoid using brood combs that are more than two years old. The brood in all its stages requires great warmth.

11. Swarms.

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 embryo 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 new queen is required at a time, the workers often have as many as ten to fifteen queen cells in the hive. Italian and Carniolan bees, or bees crossed with those strains, are particularly disposed to raise a large number of queens. 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, which have previously been 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 (**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 about four 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.

12. Casts.

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 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.

13. Prevention of Casts.

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

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 second or third evening after it issued (**76**).

14. Time when young mated Queen will lay Eggs.

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 brood will be hatched out; so that if a 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 driving bees from skeps 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.

15. Range of Flight of Bees.

Bees generally work within about a mile from the hive, but if the supply of honey within that area is insufficient, 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 beekeeper can profitably take advantage of this habit of the bee when he wishes to make artificial swarms (**188**).

16. Signs of Honey Flow.

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 (**107**) for the storage of the honey.

17. Ripening of Honey.

As gathered by the bees, honey 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.

18. Bar-Frame Hives.

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.

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

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. 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.

20. Floor-board of C. D. B. Hive.

(1.) The floor-board, (Figs. 1, 4, and 32) 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. A ventilating hole (V, Fig. 4), not less than two and preferably four inches in diameter, is cut rather to the front of the centre of the floor-board; this hole is covered on the top with perforated zinc, and a wooden shutter (S, Fig. 4) is fitted underneath it. It serves both for ventilation and disinfection.

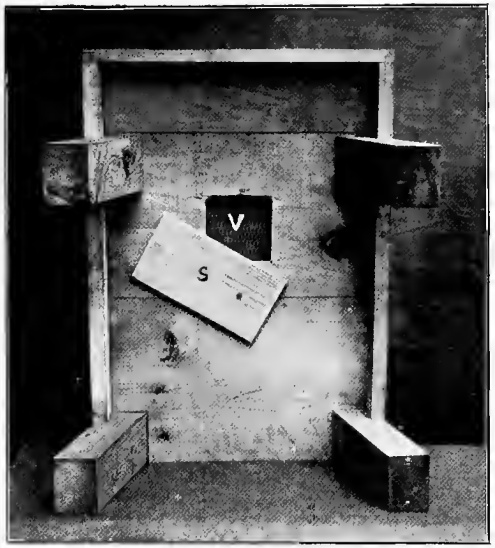

FIG. 4.—FLOOR-BOARD OF C. D. B. HIVE.
V, Ventilating hole covered with perforated zinc. S, Shutter.

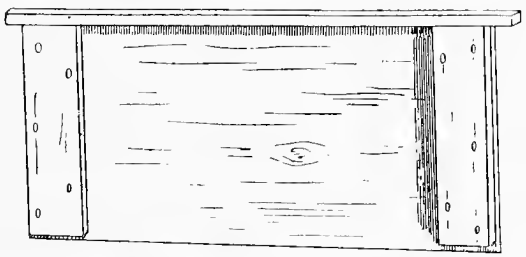

FIG. 5.—DIVISION-BOARD OR DUMMY.

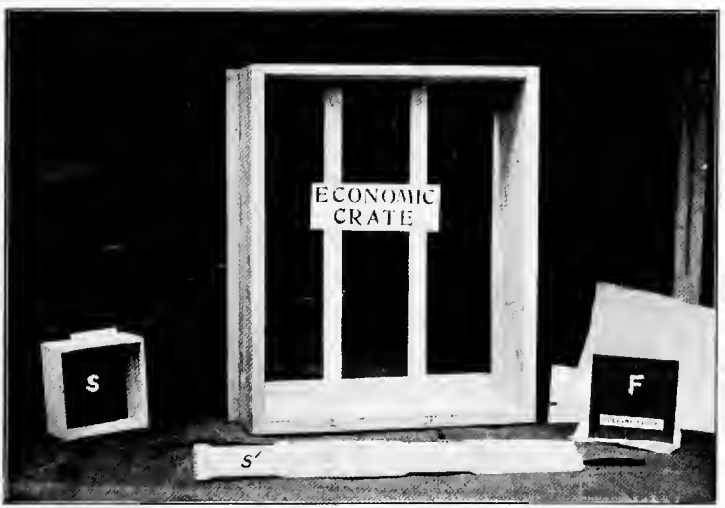

FIG. 6.—ECONOMIC CRATE.

S, Folded section; S', D-Section in flat; F, Folding block.
The crate is resting on that end at which the follower and wedges should be fixed, as indicated by the slip of wood tacked across the base at that end.

FIG. 7.—DOUBLING-BOX.

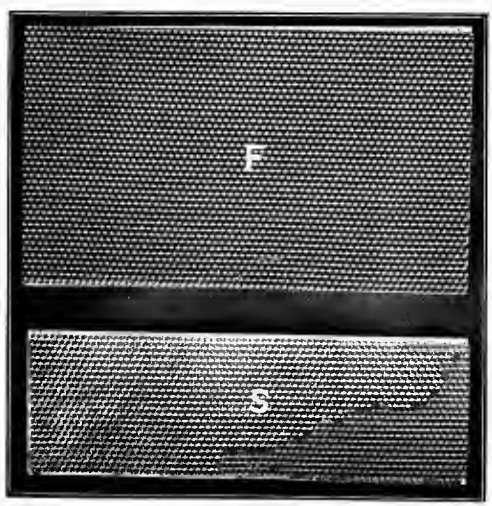

FIG. 8.—COMB FOUNDATION.

F, Frame foundation. S, Section foundation.

(2.) The body-box, or "brood chamber" (Figs. 1 and 30), 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 is raised and the winter food supply is stored. It should be made to contain at least ten, but preferably eleven frames (**24**), and a dummy (**25**). It is fitted with two sliding doors opening to the flight-board, which is protected by a movable wooden porch.

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

(3.) The lift, or raiser (Figs. 1 and 36), 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 can be fitted on 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.

(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.

Bar-frames are of the pattern known as the "Abbott" bar-frame (Figs. 1, 9 and 30). 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, and to permit of its being grooved to receive foundation: 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, separated by a very thin slip of wood, running the whole length of the frame; the foundation (**33**) is fixed in position by inserting one edge of the sheet in the centre groove; a wedge-shaped slip of wood is then pressed home in the other groove, thus tightly wedging the foundation in position (**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,

24. Bar-Frames.

therefore, best to buy machine-made frames rather than to makes frames at home, which is almost certain to prove unsatisfactory.

25. Division-board or Dummy.

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 $14\frac{7}{16}$ inches by $8\frac{1}{2}$ inches, 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 board and the laths in such a manner that it slightly projects at each side. This board is rigidly attached to an upper bar of the same length and depth as the upper bar of the frames, the whole being so constructed that when the division-board is suspended like a frame in the body-box, it is impossible for bees to pass under it, or between it and the sides of the hive. The padded slips on the sides of the "dummy" are requisite in order that the heated air in that portion of the body-box occupied by the bees may be confined therein when the "dummy" is in use.

26. Quilt and Coverings.

The quilt (Figs. 1 and 33) is a strong canvas covering, just large enough to cover eleven frames and the "dummy" when all are hung in position in the body-box, so as to prevent bees escaping from the brood chamber. Upon it are placed other warm coverings of the same shape, and 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.

27. Sections.

The kind of section recommended for use is that known as the "D" section (Figs. 1 and 6), made in one piece to hold one pound of honey. 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 $4\frac{1}{4}$ inches by $4\frac{1}{4}$ inches by 2 inches, and fastened by dovetails, which unite it at the fourth corner. To fold the section into shape for use, first damp the back of the three grooved V-joints, then bend the section round the "folding-block" provided for the purpose (Fig. 6), keeping the grooves of the joints next the block, and close the section by locking the dovetails. The two-inch wide section is recommended for use in preference to narrower sizes, as when properly filled it will contain one pound of comb honey, which a narrower section will rarely hold.

28. Separators.

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 used with the "Divisional" crate (**30**), but can also be used in the "Economic" crate. The wood is cut away at the top and bottom of the separator to allow a free passage for bees into the crate, or from crate to crate. Tin separators are not recommended; they are more expensive than wood, and are liable to buckle and rust.

29. "Economic" Section-crate.

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 underside of the crate; the sections are firmly pressed to the front of the crate by means of a wooden board or "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. 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. A slip of wood about $\frac{7}{8}$-inch broad, is tacked across the bottom of the crate *at the back*.

30. Divisional Section-crate.

The "Divisional" section-crate (Fig. 1) 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, 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.

31. Doubling-box.

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**). When in use, a sheet of excluder zinc (**48**) is placed on the frames which are in the body-box, to prevent the queen obtaining access to the frames in the "doubling"-box. The "doubling"-box is often referred to as a "super"-box.

32. Comb Foundation.

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.

33. Frame Foundation.

Frame foundation (F., Fig. 8) 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.

34. Section Foundation.

"Section foundation" (S., Fig. 8) 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 $12\frac{3}{4}$ inches by about $4\frac{1}{8}$ inches. The full sheets, measuring $12\frac{3}{4}$ inches by $8\frac{1}{2}$ inches, weigh about sixteen to nineteen to the pound. Section foundation should not be used in frames.

35. Wiring and Embedding Appliances.

Wiring and embedding appliances (Fig. 9) 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 (L, Fig. 9), and a reel or coil (R, r. and c., Fig. 9) of No. 30 gauge tinned wire.

36. Embedding-board.

The embedding-board (B., Fig. 9) for use with the "Abbott" frame, is a wooden board, which should measure $12\frac{3}{4}$ inches wide by $7\frac{1}{2}$ inches deep, by $\frac{3}{8}$-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 they shall project one inch over the board at either end, 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.

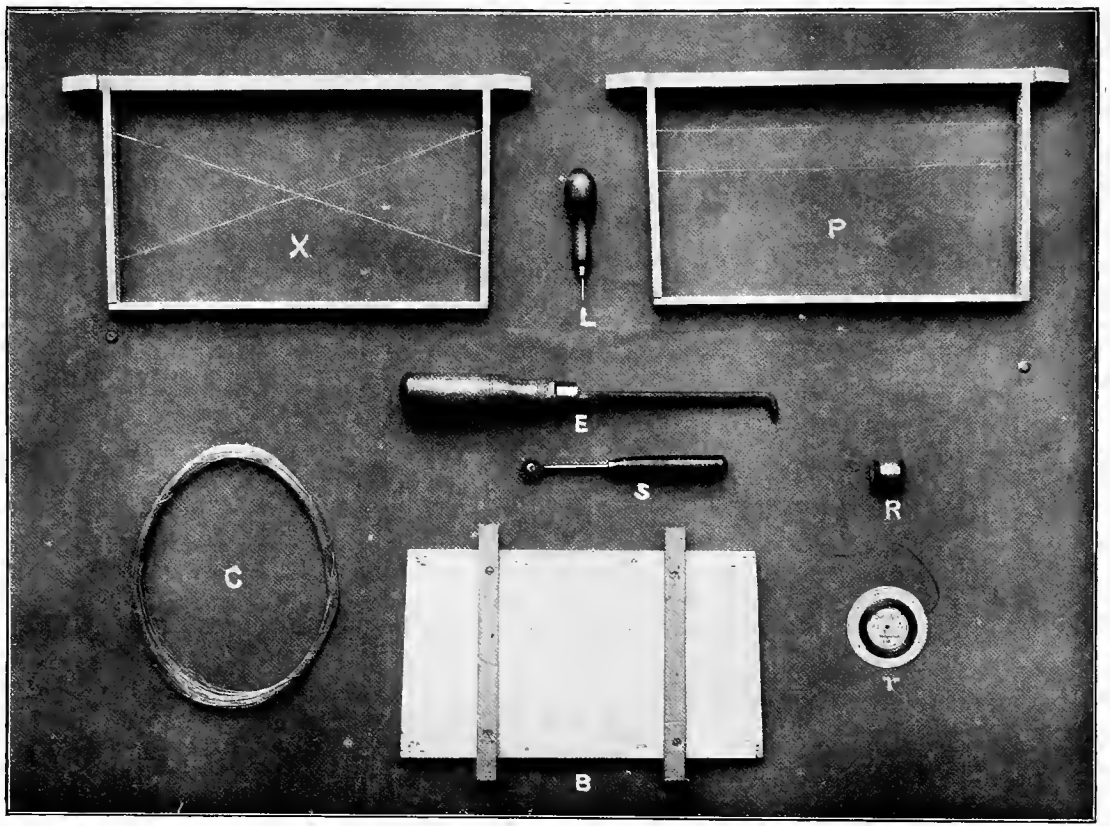

Fig. 9.—Wiring Appliances and Wired Frames.

X, Frame wired for extracting. P, Frame wired for use in brood-chamber. L, Bradawl. E, Embedder. S, Spur Embedder. R, r, Reels of Wire. C, Coil of Wire. B, Embedding-board.

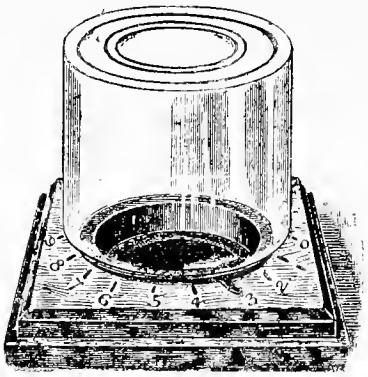

FIG. 10.—FEEDER.

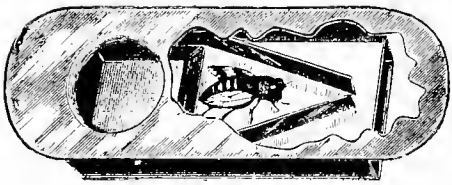

FIG. 11.—PORTER BEE-ESCAPE

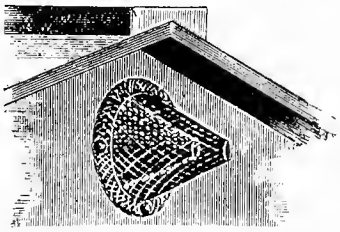

FIG. 11A.—CONE BEE-ESCAPE.

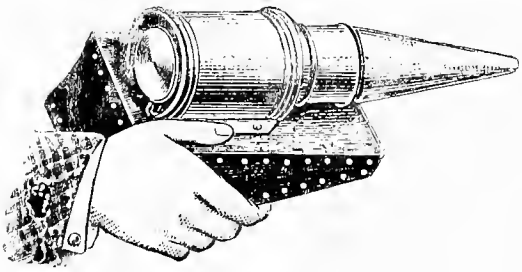

FIG 12.—SMOKER

37. The Embedder. The embedder (E., Fig. 9) is a piece of iron ¼-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. A spur embedder (S., Fig. 9) is sometimes used.

38. Feeder. Many patterns of feeders are used. The kind recommended is usually supplied in half-pint and one pint sizes, and consists of a glass jar (Figs. 10 and 33), which when in use is inverted over a tin plate inserted in a hollowed-out wooden stage (Fig. 10); 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.

39. Cheap Feeder for Slow Feeding. With the point only of a darning needle, punch a very small hole in the centre of an ordinary tin cocoa canister, the hole being just large enough to permit one drop of syrup to pass in every two seconds; when in use the canister should be placed on the quilt, the hole in the canister being over the hole in the quilt (**102**). If the canister has a fairly tight-fitting lid, it would be best to pierce a slightly larger hole in the lid, and invert the canister when in use: the vacuum which will be created, will prevent waste of syrup.

40. Cheap Feeder for Quick Feeding. 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 be done by cutting a circular hole a little wider than the mouth of the jar out of the centre of a piece of wood, the thickness of which should be such that the muslin cover of the inverted jar shall be ½-inch above the quilt when in position for feeding over the hole in the quilt (**102**).

41. Super-clearer. The super-clearer (Fig. 1) is a close sheeted frame of wood, of such dimensions that when placed under a 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 into 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 " (Fig. 11); it has proved thoroughly effective. Another, apparently very good form of bee-escape has been recently introduced by the Irish Beekeepers' Federation. The super-clearer is not an essential appliance, but by its use (**113**) supers can be cleared of bees in cold or wet weather more rapidly than by the cone clearer (**42**).

42. Cone Bee-escape.

The cone bee-escape (Fig. 11A), as fitted to the " C. D. B." hive, consists of two perforated brass cones, flanged at the base. They are fitted 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.

43. Subduing or Carbolic Cloth.

The subduing-cloth (Figs. 1 and 20) is used for subduing bees; 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 carbolic 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. Mallin's or Webster's " Subjugators " are now much used for damping the cloth in lieu of carbolic solution; they do not injure the skin, and the cloth which has been treated with either of them will remain fit for use for many weeks without being redressed, if it is carefully covered while not in use. They are sold in sixpenny bottles, holding sufficient liquid to dress a cloth several times. Many other strong smelling liquids may be used for subduing bees.

44, Smoker.

The smoker recommended for use is of the " Bingham " pattern (Fig. 12), and consists of a small hand 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 paper is the

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

FIG. 14.—APPLIANCE-BOX.

next best material; when used it should be loosely rolled up, or torn into narrow shreds, which may be twisted together. If the paper is first sprinkled with a strong solution of saltpetre and water and then dried, it will improve its smouldering qualities. 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 out. The mouth of the nozzle and the perforated disc at the base of the nozzle should be frequently cleaned. The smoker is a very desirable, but not an essential part of a bee-keeper's outfit. A subduing-cloth (**43**) is now more generally used for subduing bees, and beekeepers are recommended to use it only, so far as possible.

45. The Veil.

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

46. Sleevelets.

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

47. Appliance-box.

It is recommended that the beekeeper should possess an "appliance-box" (Fig. 14), in which appliances 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, fifteen 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 bee-keeper has a preference, should be

kept :—A table knife, turnscrew or chisel, goose or duck wing, tin of petroleum jelly, bottle of carbolic 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.

48. Queen Excluder Zinc,

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

49. The Extractor.

The extractor (E. Fig. 15) is a machine by means of which honey may be removed by centrifugal action from the comb, which may then 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. It will suffice to describe shortly the extractor depicted in Fig. 15, known as the "C. D. B." pattern. It consists of a tinned iron cylinder about 18 inches in diameter and about 27 inches high ; the bottom of the cylinder is in shape a raised cone. A steel spindle, cupped at the upper end, is rigidly fixed in the centre of the cone, above which it projects about 2 inches. Two movable cages (C, Fig. 15), having open-meshed wire fronts, and each capable of holding one frame or six one-pound sections, are held in an iron frame-work (F, Fig. 15) fixed to a vertical spindle, the base of which is shaped to rest in and revolve on the cup of the lower fixed spindle, and the upper end of which is held in a vertical position by a flat movable horizontal bar attached by wing nuts to the handle castings. A small detachable cranked handle fits on the top of the cage spindle, and serves to give the necessary rotary motion to the cage frame. A treacle tap is fitted to the lowest portion of the cylinder for the withdrawal of extracted honey. The whole apparatus can be readily taken asunder for cleaning. The cylinder is of sufficient capacity to permit of extraction being proceeded with until about 70 lbs. of honey has been extracted. The top of the cylinder is fitted with a movable wooden cover, made in two pieces. The cheaper pattern extractors are not recommended.

50. Ripener.

The ripener (R, Fig. 15) is a tinned iron cylinder about 19 inches in depth, by about $8\frac{1}{2}$ inches in diameter, and fitted with a treacle tap at the base. Its use is 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.

Fig. 15.—Extracting Appliances.

E, Extractor. F, Frame for holding cages. C, Cage. L, Lid
K, Uncapping-knife. R, Ripener. S, Strainer.

FIG. 16.—HIVING-BOARD.

strainer (S, Fig. 15) is a tin vessel constructed to fit on the top of the ripener, and to which a piece of 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. iners are made in different patterns at varying prices. The shown in Fig. 18 will be found suitable.

51. Strainer.

uncapping-knife is used for uncapping combs in frames or sections prior to extracting. The pattern illustrated (K, Fig. 15) will be found suitable. The "W. B. C." curved knife ore convenient for use when uncapping badly-filled sec-. A large table knife may be used for uncapping, but it ot at all so suitable as a special uncapping-knife.

Uncapping-knife.

frame-box should be made of wood, large enough to hold at least twelve frames, and fitted with a close-fitting lid and with 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 ve frames well filled with honey for extracting will weigh t 60 to 70 lbs. A box of the following internal dimensions d be suitable:—25 inches long, 17½ inches broad, 8½ es deep; a rail 25 inches by 1½ inches by ¾ inch to be nailed ch side of the box, at ⅝-inch below the upper rim. It is to emembered that comb for extracting is often drawn out than ordinary comb, so that the frames take up more than brood frames.

Frame-box for ying Frames for Extracting.

Hiving-board (Fig. 16) is a light board about 3 feet long by 18 inches broad, by about half-an-inch thick. Its use is to support the sheet on which bees are thrown when hiving them he hive entrance (**76**). It may be made of two nine- by half-inch boards, held together by cross-battens rneath. In the "C. D. B." hive, a slip of wood is screwed nder the front of the alighting-board to support the end e hiving-board when in use, but it is well to nail two small w slips of wood, about a foot apart, to the upper side of f the 18-inch wide ends of the hiving-board, projecting three inches, so that they may rest on the alighting-board the hiving-board when thus fitted can readily be placed sition, in front of any hive (Fig. 27).

Hiving-board.

n cages are used for introducing queens to stocks; they are made in several patterns, of which it will suffice to describe two. The "Abbott" queen cage (A, Fig. 17) consists of c frame to which is attached a wire net of fine mesh, the forming a cage measuring about 6 inches by 1⅛ inch by

Queen Cage.

$\frac{5}{16}$ inch; one edge of the cage is open for its full length, leaving an aperture 6 inches by $\frac{5}{16}$ 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.

56. Swarm-box.

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

57. Nucleus Hives.

Nucleus hives are only required for use in summer, and should be large enough to hold four standard frames and a dummy. The "Abbott" nucleus hive (Fig. 19), 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 4*s*. 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 10 or 11 frame, C.D.B. 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 floorboard 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.

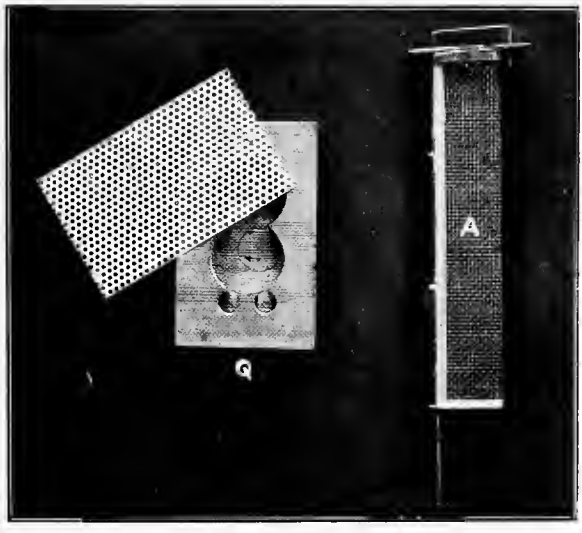

Fig. 17.—Queen Cages.
A, Abbott queen cage. Q, Queen travelling box.

Fig. 18.—Abbott Swarm-Box.

Fig. 19.—Nucleus Hive.

58. Requisites for commencing Beekeeping. The following is a list of the appliances and articles which should be procured by any one who desires to commence beekeeping on the principles recommended in these instructions :—

(1.) One yellow pine bar-framed hive, of capacity to take three crates of sections, with eleven frames and dummy; painted three coats; fitted with roof ventilating cones, and floor-board ventilator.
(2.) One canvas and two woollen quilts.
(3.) Two economic and one divisional crate.
(4.) 100 one-pound " D " sections.
(5.) Forty short, and twenty long, separators.
(6.) 1½ lbs. brood foundation.
(7.) 1 lb. super foundation.
(8.) One tin petroleum jelly.
(9.) One subduing-cloth, with stick for same.
(10.) One veil.
(11.) One glass feeder.
(12.) One wiring apparatus, with reel of wire.
(13.) One section folding-block, for " D " sections.
(14.) One sheet of excluder zinc, 16 inches by 16 inches.
(15.) One 8-ounce, or larger, bottle of Calvert's No. 5 carbolic acid, or other subjugator.
(16.) One tin or box of naphthaline balls.
*(17.) One smoker.
*(18.) One super-clearer, fitted with Porter bee-escape.
*(19.) One queen cage.

** These articles are not essential for beginners.*

IV.—SUBDUING, CONTROLLING, AND HANDLING BEES.

59. Stings. Bee stings are to be avoided not only because of the pain which they produce, but because if one bee uses its sting, it is almost certain that the other bees will become irritated and difficult to manage. It is, therefore, manifest that the bee-keeper should not only take precautions to avoid being stung, so far as that can be done without being unduly hampered, but the bees should also be handled in such a manner as to irritate them as little as possible.

60. Protection from 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.

61. Position of Operator.

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. 13): 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.

62. Handling Bees.

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, when they will probably become pacified. If the frame shoulders have been fixed by propolis, it will be difficult to move 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, always keep them over the body-box, so that any bees when falling may drop into the hive; if the frame is held over the ground the queen may be lost, and creeping bees are disposed to crawl up the operator's legs. 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.

63. Controlling and Subduing.

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, as described in the three following paragraphs.

64. Use of Carbolic Feather.

When about to examine a hive, first take a long, strong feather such as a goose quill, saturated with carbolic solution (**180**), and push it as far as possible into the hive through the door and under the frames, leaving it 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 carbolic solution; this tends to prevent the bees running out on the shoulders of the frame while it is held by the operator.

65. Use of Carbolic or Subduing-cloth.

Having inserted the carbolic feather, prepare, and apply the subduing-cloth (**43**). First, damp it with carbolic 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, drawing it sideways across the frames, and as the upturned quilt is drawn off exposing the top bars of the frames, draw the carbolic cloth after it, holding the stick horizontally so that the cloth shall lie on the frames (Fig. 20). Then lay the quilt on the ground underside 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 carbolic 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 feather (**64**) may be withdrawn from the entrance. The carbolic cloth should be allowed to rest on the frames for two or three minutes, after which it may be partially or entirely removed as may be necessary, always keeping it at hand for use if required. If it is necessary to lift the dummy (**25**), another carbolic 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 carbolic cloth and feather; or the smoker (**66**) may be used. It is to be understood that several substances may be used in lieu of carbolic solution for subduing as above described (**43**). To replace the quilt, spread the carbolic cloth over the frames; then spread the quilt flat on the carbolic cloth; next, while holding one side of the quilt with one hand to retain it in its proper position, withdraw the carbolic 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 over the bar-frames so that it may trickle down the combs; 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.

66. Subduing with Smoker.

Although the use of the smoker is not recommended in ordinary practice, its method of use will be explained, as it may be convenient to use it in the absence of a carbolic or other subduer, or if the operator fails to subdue the bees with the subduing-cloth and feather. Having charged

and lighted the smoker (**44**), insert the nozzle at the hive door, and then blow in three or four good 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 apply the carbolic cloth (**65**), or if the smoker is to be used instead of it, blow puffs of smoke on the tops of the frame as the quilt is withdrawn; the smoker should then be placed at hand, nozzle up, for further use when necessary.

V.—ARRANGEMENT OF APIARY.

67. Commencing Bee-keeping.

The months of April and May are those in which it is best for the beginner to commence bee-keeping, provided that swarms or stocks can then be had. Swarms are rarely obtainable before the middle of May. Unless a stock in a bar-frame hive is procured, the bees must necessarily be provided in one of the following ways :—

(1.) By providing a natural or artificial swarm.
(2.) By transfer of a stock from a skep or other fixed comb hive.

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

68. Site of Apiary.

The hives should preferably face the south-east, and it is desirable that they should be protected from northerly winds; but 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 the 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 all apiarian operations being carried out 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. The apiary should not be placed in such a position that animals or people are likely to pass frequently to and fro across the line of flight within about fifty yards of it. 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 having a free flight over the front row. Double rows of hives close together should not be adopted except from want

FIG. 20.—SUBDUING-CLOTH IN USE
S, Subduing Cloth. Q. Quilt.

FIG. 21.—COTTAGE APIARY IN DONEGAL

FIG. 22.—MARKING A FRAME FOR WIRING.

FIG. 23.—WIRED FRAME,

a, *b*, Places where wire is tied to Frame.

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 fronts of the hives, should be painted in different colours, so that bees may readily recognise their own hives; queens are sometimes lost when returning from their nuptial flights, owing to their failure to recognise their own hive. Fig. 21, represents a well arranged cottager's apiary, in Donegal.

69. Hive Stand.

The hive should stand upon a solid foundation, capable of sustaining it perfectly level when it is fully loaded with honey. A "C. D. B." hive, carrying five crates of well-filled sections, might weigh about 1¾ 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 about three inches above the ground level, and measuring 26 inches by 26 inches. 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.

70. Reason for Wiring.

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 the foundation in them. Several methods of wiring are practised, the object being to support the foundation by wires so placed as to injure the future brood nest as little as possible.

71. Wiring Frames for Brood-chamber.

To wire a frame, place the embedding-board (**36**), flat side upwards, on a table, so that one end of each cross slip may slightly project over the table edge; mark the edge of the board at $1\frac{1}{2}$ inches and 3 inches from the outer edge of one of the slips; these marks to be permanent; then hang a frame on the projecting slips, letting the side of the frame rest on the slips with the top bar $1\frac{1}{2}$ inches from the first mark (Fig. 22); then with the brad-awl bore two holes perpendicularly through the centre of the frame side opposite the marks on the embedding-board; the holes will thus be $1\frac{1}{2}$ inches and 3 inches respectively from the under side of the top bar; then bore two holes in exactly similar positions in the opposite side of the frame. Cut off a piece of wire (**35**) 44 inches in length, see that it is quite free from kinks, then knot one end of it to the frame side at "a," Fig. 23, making the knot as indicated by the diagram, Fig. 24; then pass the wire through the corresponding hole in the opposite side of the frame, pull it tight enough to twang sharply when touched, and without losing any tension, twist the wire right round the frame side and pass it in again through the hole from outside, then lead it down inside the frame, pass it through the hole opposite "b," Fig. 23, then round and through the frame side, exactly as at the hole above, then through the hole at "b," and knot it, as at "a." The wires should be tight enough to twang sharply when struck.

72. Wiring Frames for Extracting.

The above method of wiring is the best to adopt when stocks are to be worked mainly for sections, as it provides sufficient support for the comb hanging perpendicularly. If, however, it is intended to work the stock for extracting (**118**), it is best to wire the frames as shown by X, Fig. 9; this system interferes more with the brood nest than the parallel system of wiring described above, but supports the comb better than that system during the process of extracting.

73. Fixing Foundation in Frame.

To fix the foundation in the frame after the latter has been wired, hold the frame inverted perpendicularly, 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. 25), and then draw it gently backwards and forwards to work it down into its proper position fully home in 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 arm (Fig. 26), then holding the wedged slip in

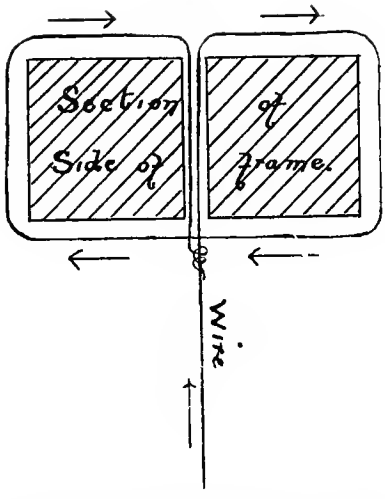

Fig. 24.—Method of Fastening Wire.

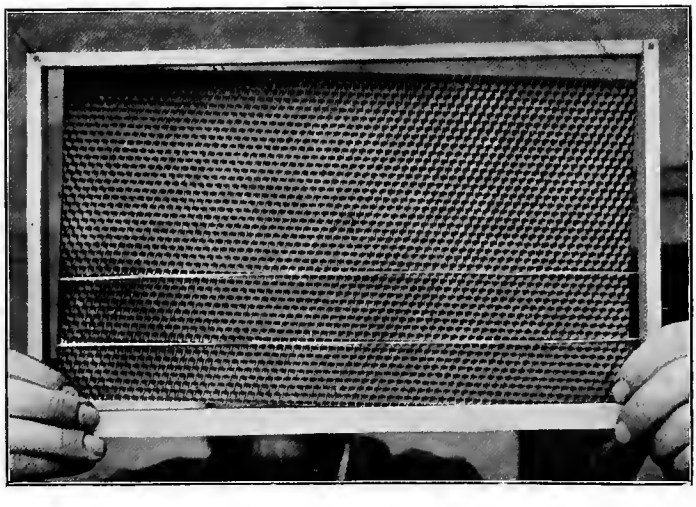

Fig. 25.—Placing Foundation in Frame.

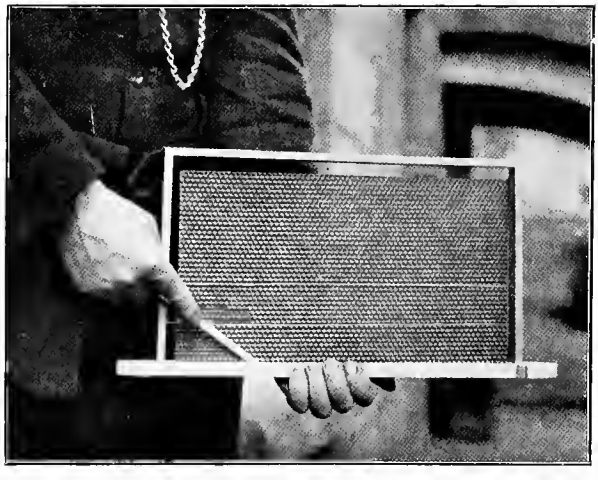

Fig. 26.—Wedging Foundation in Frame.

a slanting position as indicated by Fig. 26, run the end of the wedge right along the groove, so as to press the mid-rib against 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.

74. Embedding Foundation.

To embed foundation in the wires in the frame, lay the frame 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 a little, 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.

75. Fixing Hive in position and preparing it for Swarm.

To prepare a hive for receiving a swarm, place the floor-board (**20**) in correct position on the stand, the legs resting as close as possible to the back edge of the stand (**69**), in order that the operator may stand close up to the back of the hive when manipulating it. Next, with a spirit level, ascertain if the floor-board is level; if a spirit level is not available, a basin 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 side 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; 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. 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 slightly 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.

76. Hiving a Swarm through Hive Entrance.

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**). 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 circumstances, 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. 27), place the hiving-board (**54**) in position against the alighting-board (**20**); on it spread out a white sheet, 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. 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 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,

Fig. 27.—Hiving Swarm through Hive Entrance

the bees still show a disinclination to enter the hive, a sharp 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.

77. Queen lost when Hiving.

If the queen has not been discovered when hiving, the hive should be looked at about an hour later; if it is then noticed that bees are clustering outside the hive, such clusters should be spread out with a feather and examined, as possibly the queen may be in one. If the queen has been destroyed or lost in transferring or hiving, the bees will issue from the hive in force a few minutes after having been hived, and search for her all about the exterior of the hive. If it appears that the queen has been lost, act as described in paragraph (152).

78. Examination of Hive after Hiving a Swarm.

The hive should be examined about two days after hiving a swarm to ascertain if the queen is present and uninjured, and if the foundation has not broken down. To do this, remove the roof (**23**), lift (**22**), and quilt (**26**), replacing the latter by the subduing-cloth (**65**); then draw back the dummy so as to afford space to permit of the frames being drawn back and examined one by one. If the weather is mild, frames may be gently lifted out for examination, one at a time, care being taken not to strike them against adjoining frames nor the hive sides, and to hold them so that the foundation or comb shall always hang perpendicularly; if held otherwise the weight of the bees, or of the bees and honey, is very liable to break the foundation or newly-made comb. If the foundation or comb of any frame has broken down, hold the frame over the body-box, and, with a feather, brush the bees off it into the hive; then insert a fresh frame of foundation in place of the frame withdrawn. Split in two, two balls of naphthaline (**172**), and drop them on to the floor-board, between the back frame and the dummy; renew the supply when these become exhausted. Before closing the hive do not fail to make sure that the top bar of the dummy and the shoulders of all frames in the brood chamber are pushed as far forward as possible.

79. Treatment of Stock after Hiving a Swarm.

The length of time which should elapse before inserting a frame to spread the brood chamber (**90**) after 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 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 (**108**).

80. Hiving a Swarm by Casting Bees into Brood-chamber.

As already stated, it will sometimes occur that owing to threatening rain, limited daylight, or other 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 top of the shoulders of the frames and dummy and the channel beneath them with carbolic solution (**180**), draw the dummy to the back of the body-box and spread the frames, leaving the centre frames about two inches apart. Next, if necessary, sprinkle the bees 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.

81. Driving Appliances.

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 and a skewer, a subduing-cloth (**43**), a feather dipped in carbolic solution; 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 1½ inches at each end turned at right angles and pointed.

82. Open Driving from a Skep.

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. First spread a carbolic 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

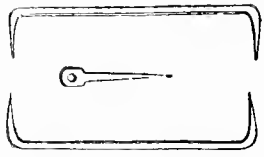

Fig. 28.—Driving Irons.

Fig. 29.—Driving Bees from a Skep.

olic cloth. The fumes rising from the carbolic cloth will
e the bees to gorge (**63**) and drive them upwards. Now
the bucket about ten to twenty yards from the skep. After
minutes remove the stone, let the skep down on the car-
cloth, and then lift and invert the skep, taking care that
outh is entirely covered by the cloth, thus confining the
therein; then place the inverted skep in the bucket and
a empty skep into position on the stock hive, as indicated
ig. 29, using the skewer to pin the skeps together where
rims meet, and the driving irons to hold the empty skep
e proper angle; the skeps should be skewered together at
point on the rim of the inverted skep towards which the
s run. Next remove the carbolic cloth, and rap the
hive sharply with the hands so as to jar the combs
out detaching them; the bees will soon run up into the
y skep, during which period a careful watch should be
for the queen, as it is important that the operator should
vare that she has passed into the upper skep. The skeps
ld be so placed that the operator when driving shall have
ack to the strongest light. When all the bees, or as many
re required, have been driven, the driving irons may be
oved and the new hive with the driven lot may be covered
for removal, or if it is desired to catch the flying bees in it,
ould be placed on the old skep stand; the hive from which
bees were driven should be replaced on its stand if it is
ided that the flying bees shall return to it; whereas if all
have been driven from it in order that the honey comb
be removed, it should be covered and put away so that no
can get at it.

old or wet weather, or late in the evening, driven bees are slow to go up into the new hive; in such circumstances it is best to place the new skep or hive directly on the top of the old and to fix it there with skewers so that the bees will not ble to escape; proceed then as in open driving (**82**). This lled "close driving." The drawback to this method is the queen's movements cannot be observed.

Close Driving.

e stock which is to be transferred is in a wooden box, the same procedure should be adopted, except 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 the inverted box hive and held there by two nails; to avoid rbing the bees before driving is commenced, the nails ld be driven through the rim of the upper box before it is d in position, and holes to receive them should be bored in im of the lower box, after which the nails should be driven e. If necessary, the upper box may be further supported ne or two laths tacked to the side of each box.

Driving Bees from a Box.

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

85. Transferring Comb and Bees from Fixed Comb Hive to Bar-frame Hive.

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

86. Transferring Bees from a Fixed Comb Hive to a Bar-frame Hive.

The best time to transfer a stock from a fixed comb hive is, when the stock is so strong that the bees would probably soon swarm if left alone (**92**); the sooner the transfer is effected after that period, the better; therefore the stock that is to be transferred should be pushed forward as much as possible by stimulative feeding (**106**). To stimulate the stock in the fixed comb hive, a feeder should be fixed on the top of the box or skep containing it, a cheap pattern feeder (**39**) would serve the purpose very well; the feeder should be secured in position by wires, and protected from the weather by a covering-box or skep; if the stock is in a pointed topped skep, a slice may be cut off the top of the skep, leaving a hole about an inch wide over which the feeder may be placed. 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 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**. When the fixed comb hive is strong in bees, with combs well covered, which may be ascertained by lifting and examining it (**87**) early in the morning or late in the evening without subduing the bees with smoke or carbolic cloth, prepare the bar-frame hive as for receiving a swarm (**75**), except that the number of frames to be given is five, and these should contain empty drawn-out worker comb, if such frames are available; 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 a half-inch board, the top of which should lie flush with the tops of the bar frames (**95**). Fit a quilt of American cloth, glazed side down, over the frames; if American cloth is not available, an ordinary quilt will do; in it cut two parallel slits each 6 inches long, midway between the sides, one being

between the first and second, and the other between the fourth and fifth frames, then make a cross cut in the quilt from the end of one slit to the end of the other, and turn the flap thus made under the quilt. Place the skep or box containing the stock to be transferred over the hole in the quilt, put on the lift, and pack well all round, so as to maintain warmth and to 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, and attend to feeding, as it is necessary to stimulate breeding (**106**). About ten 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 appears to have commenced below, remove the skep, and examine the frames for eggs or larvæ; if breeding has commenced, ascertain if the queen is on the frames; if she is not, it will be necessary to drive the skep (**82**) to find her, after which secure the quilt in its former position, place a sheet of queen excluder over it, and return the skep, packing it securely round the edges as before: then hive the driven bees with the queen at the entrance (**76**). 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.

87. Transferring Bees from a Fixed Comb Hive to a Bar-frame Hive on the "Alley" Method.

The "Alley" method of transferring has been worked with very satisfactory results, and is by many preferred to the method of transferring already described (**86**); by the "Alley" method the queen is at once placed in the body-box, and there confined. If the bee-keeper has any doubt as to the stock being in proper condition for transferring, it would be best to transfer on the system already described (**86**). The proper time to transfer on the "Alley" method is, just before the stock may be expected to swarm naturally (**92**), that is to say, when there is a good honey flow, when the stock is strong in bees and brood, and when the weather is warm enough to permit of the operation being carried out without chilling the brood in the old hive by the removal of most of the bees. A simple way of ascertaining the strength of a stock in a fixed comb hive is, to tilt the front of the hive upwards early in the morning; if the stock is strong, the stand will be covered with bees. It is a correct but not an essential indication that a stock is crowded and in fit condition for transfer, if the bees cluster outside the hive. As a rule, stocks should not be transferred on

the "Alley" system before the middle of May, but may be transferred at any later time during the summer, subject to the conditions stated above. It will be assumed that the stock to be transferred is in a straw skep, and in proper condition for transferring. Prepare a stand for the new hive (**69**); then place the bar-frame hive to which the stock is to be transferred, on the stand as already described (**75**); next place six frames containing wired foundation in the front of the body-box (B., Fig. 30); if a frame of honey can be procured from another hive, place it behind the six frames; push the dummy close up against these frames, and place the rest of the frames in the hive behind the dummy (A., Fig. 30); place a sheet of thin newspaper over the frames, and on this place a sheet of cardboard measuring 18 inches by 16 inches, in which cut a circular hole 7 inches in diameter, the centre of the hole being 4½ inches from one of the 16-inch wide ends of the cardboard, and 8 inches from each of the other sides; this will leave a width of one inch of cardboard at the point where the hole comes nearest to one end of the sheet; any thin substance through which bees cannot penetrate, such as thin wood or tin, may be used instead of cardboard. If a frame of honey is not available for insertion behind the six frames of foundation as already recommended, a hole about the size of a shilling should be cut through one of the front corners of the cardboard and the newspaper underneath, in order that a small bottle of about half-a-pint capacity may be inverted thereon, for feeding the bees with syrup. Place the cardboard over the newspaper on the frames (Fig. 31), with the large hole over the six front frames marked "B," Fig. 30. Unless the newspaper is very thin, the portion exposed under the hole in the cardboard should now be lightly sprinkled with water to soften it, then cover the hole in the cardboard with excluder zinc. The preparatory work so far described may with advantage be performed at any time prior to the transfer of the stock. Next, drive the queen and most of the bees into an empty skep (**82**), leaving in the old skep sufficient bees to nurse the brood. Then place the old skep containing the brood and nurses on the cardboard, so that it shall entirely cover the 7-inch hole therein, the rim of the skep resting entirely on the cardboard (Fig. 32), leaving the feeding hole exposed. The hole in the rim of the skep, which served as a door, must be plugged up. Now place the lift on, and if a frame of honey has not been provided in the body-box, fill the small feeding bottle or tin with syrup; if a bottle is used, tie a piece of coarse muslin over its mouth and invert it over the small hole in the front corner of the cardboard: then carefully pack all round and over the skep with cloths or hay, taking care when doing so not to move the feeder, if used, from its position, and to leave no aperture except the hive entrance by which a bee can escape from either skep or body-box; then fit on the roof. The driven bees should then be hived (**76**). On the third or fourth day after transferring, lift off the skep and examine the frames to see if the queen is laying: if she is laying the newspaper may be removed, but the

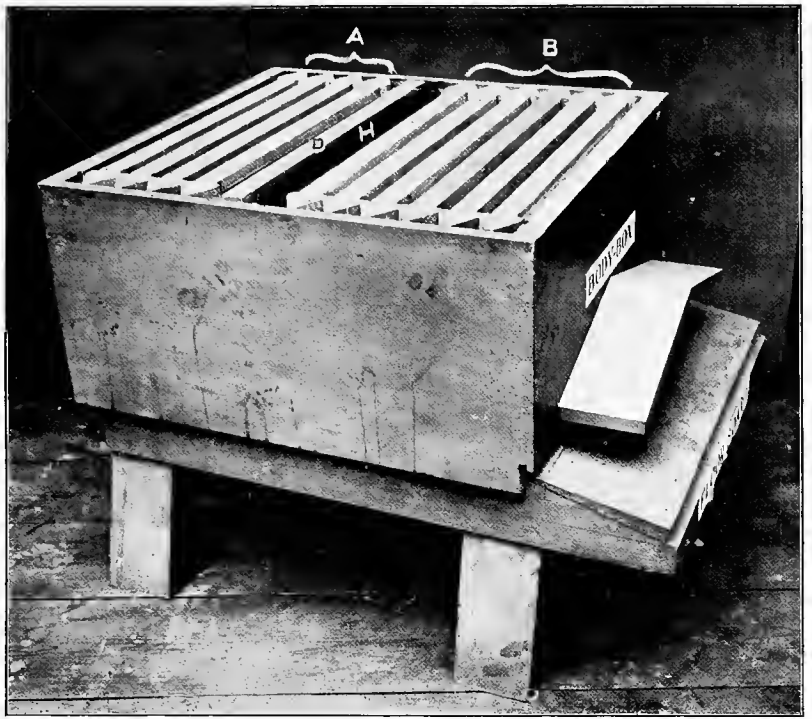

FIG. 30.—BODY-BOX, WITH FRAMES ARRANGED FOR TRANSFERRING ON "ALLEY" METHOD.

B. Six Frames containing wired foundations. A, Empty frames. D, Dummy. H, Frame of honey.

FIG. 31.—BODY-BOX, WITH EXCLUDER ZINC AND CARDBOA IN POSITION FOR TRANSFERRING ON "ALLEY" METHOD.

Z, Excluder zinc C, Cardboard.

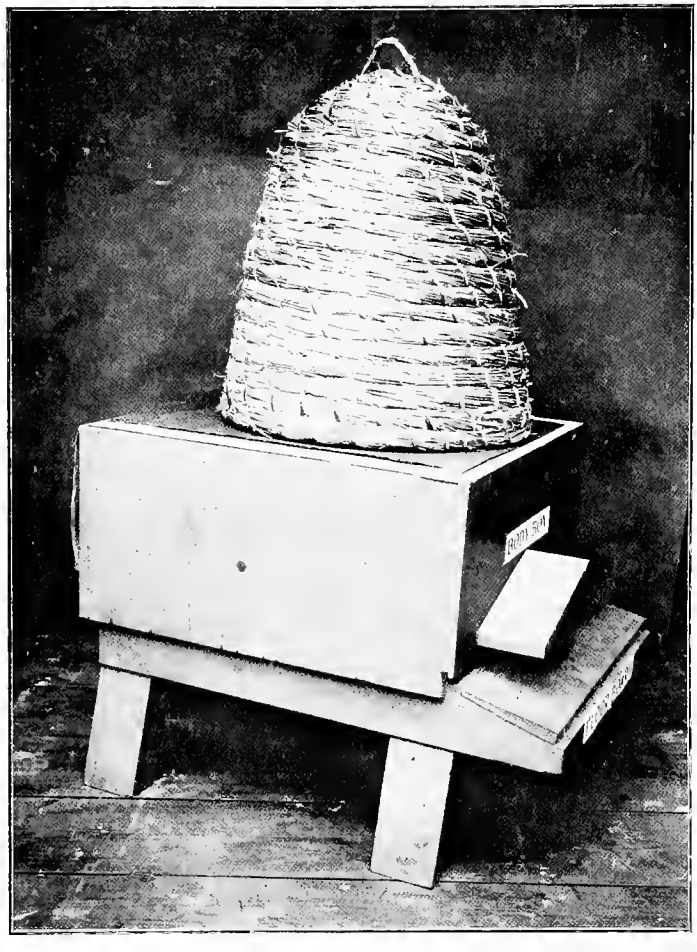

Fig. 32.—Body-Box, with Skep in Position for Transferring on "Alley" Method.

rdboa..., ...zinc, and packing should be replaced. If examination it is found that the bees have deserted the ood chamber and gone up into the skep without having pre-ously drawn out the foundation, it indicates that the news-per was damped too much, in which event the operations ust be repeated, damping the newspaper less; or, if the paper very thin, not damping it at all. If the bees have gone down intended, the skep should not be removed for twenty-one ar days, so as to allow all worker brood in it to be hatched t. If the skep contains new comb, it should be left on for out another week or longer, in order that it may be filled th sealed honey before removal. On removing the skep, ve all the bees out, and return them to the frame-hive by the trance; then place one frame of stock foundation in the ntre of the brood chamber, and put on a crate of sections **10**), if the conditions permit of doing so. Brood-spreading **0**) must now be attended to until the stock occupies ten mes.

X.—BROOD-SPREADING.

ood-spreading signifies artificially expanding the area occupied by the brood nest, by placing a frame of foundation or empty comb in the centre of the brood chamber for the queen to lay in. By providing empty cells in the centre the brood chamber, the queen is induced to lay more rapidly an she otherwise would; it also lessens the tendency to arm, by providing space for the queen to lay in when there e few vacant cells available for that purpose. In the early ring, the brood nest in a bar-frame hive occupies a somewhat cular space in the centre of the middle frame and a few mes on either side; the area thus occupied is gradually tended as the season advances, provided that the conditions breeding are favourable. The area of comb occupied by ood in each frame diminishes the further the frame is from e centre of the brood nest; in a strong, well-managed hive, ood would in early summer occupy part of the eight or nine ntral frames, whereas a weak stock might have brood in only ee or four frames, because the queen will limit the number eggs laid in accordance with the capacity of the stock to ovide nurses. At times every frame in a strong stock may be re or less occupied by brood.

88. Reasons for Brood-spreading.

ood-spreading should not be practised unless there is a sufficient supply of food, nor in chilly, inclement weather. If necessary, artificial feeding (**103**) should be resorted to, otherwise brood-spreading will cause more harm than d. In districts in which the honey flow commences in May early in June, it is most important that the stocks uld be brought up to full strength before that period early feeding (**106**) and brood-spreading; in such cases

89. Time for Brood-spreading.

brood-spreading carried on with care, and accompanied by judicious feeding, may advantageously be practised, provided that plenty of covering is supplied 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 (**86**) (**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.

90. Method of Brood-spreading.

Brood-spreading is carried out as follows:—After subduing the bees (**63**), leave the carbolic cloth on the frames, then draw back or lift out the dummy, next identify the shoulders of the centre frame by following the top bar with the fingers of both hands over the carbolic cloth, grip both shoulders of this frame and press it and the frames behind it gently back, so as to leave a space of about three inches between the frames in the centre; then remove the carbolic cloth, turning it back from the front of the hive sufficiently to expose the space in the centre, into which lower the frame which is to be introduced, having first marked the date on the top bar, and smeared the shoulders with petroleum jelly; then press the dummy and frames tightly to the front, and replace covers. 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. It is perhaps well to repeat here the caution already given, that all unnecessary examination of an open hive is objectionable, and that the beekeeper should therefore endeavour to combine the operation of brood-spreading with any other operation which may necessitate the opening of the hive. When the body-box is full 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. Generally speaking it will suffice to give five new frames of foundation annually to a ten-frame stock. 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 portion containing drone cells should be cut out, and the frame should then be placed next the dummy, to be removed when the brood has been hatched out.

XI.—NATURAL SWARMING.

91. Natural Swarming.

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

92. Signs of Swarming.

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 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**).

93. Securing a Swarm.

When the swarm is settling down, or immediately afterwards, it should be sprinkled with cold water to cool and wet the bees, so that they shall have no tendency to rise. This may conveniently be done with a sprayer, syringe, or wisp. The next thing is to get the swarm safely into a straw skep, or if a skep is not available, into a light box or pail. 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, say within an hour, they will probably ascend into it; if they do not, they may be induced to do so by placing a cloth saturated with carbolic solution (**180**) under them. When by either method the swarm has been secured in the skep, it should be taken down, and the mouth should be covered with a cloth of butter muslin or open canvas, so as to confine the bees to the skep while giving them plenty of air; the skep may then be left in a cool shady place until required for hiving (**76**), placing it mouth downwards, but tilted for ventilation. If the skep containing the swarm were left uncovered, the bees might abscond from it, 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**).

94. Identifying Hive from which Swarm Issued.

To identify the hive from which a swarm has issued, remove a handful of bees from the swarm, sprinkle them lightly with water, dust them with flour in a cup or bowl, take them to a position in the ordinary line of flight to the hives, throw them up in the air at about twenty or thirty yards from the hives, and then watch the hive entrances to ascertain which hive the floured bees will enter.

95. Treatment of Parent Stock and Swarm.

The parent stock and swarm should be treated as follows :— 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 two frames of foundation are 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.) Foundation frame.
(3.) Capped brood frame.
(4.) Foundation frame.
(5.) Capped brood frame.
(6.) 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 (**76**). Then place a 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 bar-frames. 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, if possible not less than thirty feet 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.

96. Alternative treatment of Stock and Swarm to avoid increase of Stock.

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. 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 a board behind the dummy and place super crates, as explained in paragraph **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.

97. Returning Swarm to Parent Stock.

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 alongside the hive until the third day after it issued, on the evening of which day it should be returned to the parent stock by casting it in (**80**). This procedure lessens the tendency of the stock to swarm again, as

all eggs in the hive will have hatched during the three days prior to the return of the swarm, and the swarming fever will probably have spent itself. Before returning the swarm, examine the parent stock and remove all queen cells; 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**.

98. Treatment of Swarm which issues from Hive Supered for Extracting,

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 a board behind the dummy (**95**) 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**).

99. Treatment of Swarm issuing from a Hive which it is intended to work for Extracting.

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, act according to the instructions given in paragraph **120**.

100. Casts.

Casts are swarms which issue after a 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 cast or after-swarm may be taken, provided that it issues before the middle of June in an early district, or the middle of July in a late district, and provided that care is taken later on, when the young queen is laying, to bring the parent stock up to full strength for wintering, by judicious brood spreading (**90**) and feeding (**103**) if necessary. The objection to allowing casts to issue later than the dates named above is, that there would be considerable likelihood that the young queen of the parent stock would not be mated so late in the season. If however, a mated queen is available in a nucleus

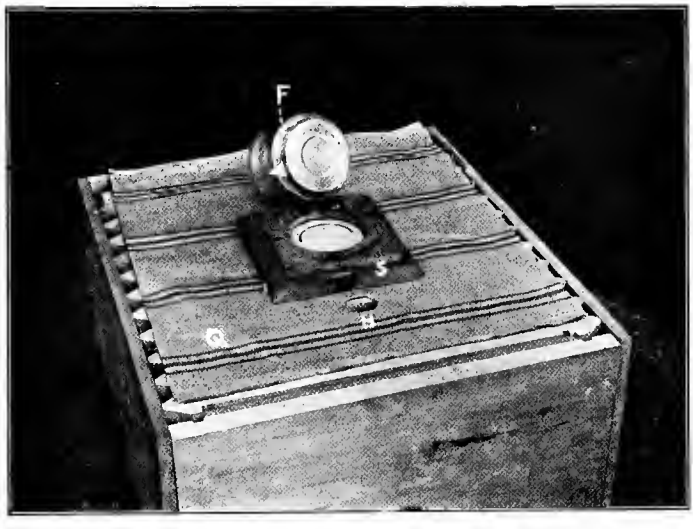

Fig. 33.—Body-Box with Quilt arranged for Feeding.

Q, Quilt. H, feeding hole in quilt.
F, 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."

hive (**148**) a cast may be taken with safety a month later than the dates given above, the mated queen being substituted for the virgin queen of the cast.

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 transferred from a fixed comb hive on the systems recommended (**86**) (**87**), if a frame of honey is not available for the purpose.

In Autumn :—(*a.*) To stimulate breeding or to encourage the drawing out of comb. (*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.

102. Method of Using Feeder.

The feeder (**38**) is used as follows :—Cut a hole about the size of a shilling in the quilt, about three inches from the front and midway between its sides, leaving a section uncut so that the flap may be turned back for feeding and afterwards replaced (Fig. 33). Place the feeding stage on the quilt, figures up and to the back of the hive, the hollow in the centre of the stage being over the opened hole in the quilt ; then, having filled the glass feeder with syrup and screwed the cap on, place it in inverted position on the stage, with the marker pointing to the number of holes to which it is desired that the bees shall have access. The hive should then be warmly packed around the feeder, to prevent the escape of heat, 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**). It is also to be remembered that as the introduction of a feeder above the brood nest causes a loss of heat, a little extra covering should be supplied over the brood nest, and especially around the feeder.

103. Summer Feeding

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 summer syrup (**178**), giving two holes of the feeder (**38**). 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 as recommended to two holes ; 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, if on, should be removed, and the stock should be fed with summer syrup (**178**) by the feeder, giving it such a number of holes as may be necessary. If the hive is on the verge of starvation when noticed, the feeder should be left on with all holes open. 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, about two to four holes should suffice; two holes would be sufficient for a weak stock. 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 $\frac{5}{16}$ in. to $\frac{3}{8}$ in. deep should be cut for the workers to pass through. A good method of providing for 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, a sheet of American cloth or other suitable material impervious to bees being interposed between the hive and crate: in this cut three holes, each the size of a shilling, so placed that a hole shall be under each row of sections when the crate is in position. The interposition of the cloth between the hive and store will cause the bees to rob the latter. Frames and sections may be hung up at a distance of not less than fifty yards from hives for the bees to empty, but this practice is not recommended, as the honey thus offered can be collected by the bees of other hives and by wasps, and the combs would be liable to injury from exposure. 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 side 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.

104. Autumn Feeding.

When it is desired to stimulate breeding in order to bring a stock up to the full strength for wintering, it should be fed with two holes, but not more, of summer syrup (**178**). In order that a stock may winter safely, it should be provided with not less than twenty 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**) giving the full number of holes, and 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 the bees can collect the material for capping. A cheap pattern quick feeder (**40**) holding one quart, would be very suitable for autumn rapid feeding.

105. Supplemental Feeding at end of Winter.

The bee-keeper 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 carbolised 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 them, no food need be given ; but if they are empty, 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.

106. Spring Stimulative Feeding.

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 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 carbolised 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 1½ 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, 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.

108. Time for Supering.

A strong stock would usually be ready for supering in early honey districts in Ireland, about the middle of May. 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 $\frac{3}{4}$ inch below the top bar in order to provide increased storage space for honey, a super may be put on.

109. Preparing Economic Section-crate.

To prepare an economic section-crate for use, first place three folded "D" sections (**27**) in a row across that end of the section-crate beneath which there is no slip of wood (**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. 34), then, with the other hand insert a $12\frac{3}{4}$-inch by $4\frac{1}{8}$-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 the sections, and wedge it tightly against them by inserting two or three springs (**29**) between it and the back of the crate (Fig. 35). If the crate is fitted with metal girders instead of laths, it will be necessary to cut small V pieces out of the foundation to permit of its being let down over the girders in the correct position. 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.

110. Placing Section-crate.

To place a section-crate, uncover the hive, remove the lift, place the crate on the lift, remove the quilt, and at the same time draw the subduing-cloth over the frames (**65**); 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

little finger of one hand, and with a rapid movement to o side jerk off the cloth and at once place the crate in positi over the frames. If these movements are performed quick it will be possible to place the crate before a bee rises abo the frames. The crate should be placed with its narrowest si to the front of the hive on an 11-frame hive, and with broadest side to the front on a 10-frame hive. The front si of the crate should rest on the top bar of the front frame, a the sides of the crate should so cover the shoulders of t frames as to leave no spaces through which bees or heat c escape from the brood-chamber. If for any reason the cra is placed over less than nine frames, fit a board 16½ inches lon ½ inch thick, and as wide as is necessary, to lie across the bo box behind the dummy, so as to prevent bees getting behi the dummy; the top of this board should lie flush with the to of the frames. Now replace the lift, and pack well with clot all round and over the crate, to prevent the escape of hea taking care when doing so to pack well round the edge of t crate, and to avoid moving the crate out of position. Th place wedges between the back of the hive and the top bar the dummy, to keep the latter in position.

111. Tiering.

If the conditions are favourable for collecting honey, and t stock is strong, it should be capable taking another crate in about seven to t days. Under exceptional conditions might be advisable to give a second crate on the fifth or six day after giving the first. It is most important to provi additional storing accommodation for the bees in advance their requirements, as otherwise they will probably start que cells and prepare for swarming (**91**) which should be avoided the production of honey is the object in view. The objection putting on two crates at once is that to do so would probat chill and therefore retard the progress of the hive. In exce tional circumstances the experienced beekeeper may put on t crates together if he cannot add the second crate at the prop time, but this practice is one that should be avoided if possib If the weather has been favourable for honey gathering aft putting on the first crate of sections, the beekeeper shou examine that crate on the seventh or eighth day after it w put on, to ascertain if the bees are ready for a second crat To do this, the covering of the crate should be removed ju enough to permit of examining the back of the back row sections; the follower should not be removed, nor should t sections be disturbed, but the upper edge of the follower m be drawn back against the springs to widen the area of observ tion. If it is noticed that the combs are crowded with bee or that they have partially drawn out the foundation sheets the sections, a second crate may be added if the weather favourable; but if the weather is unfavourable it should n be added until there is a change for the better. If, howev there are very few bees on the sides of the three back sectio next the follower, or if these sections have not been drawn o

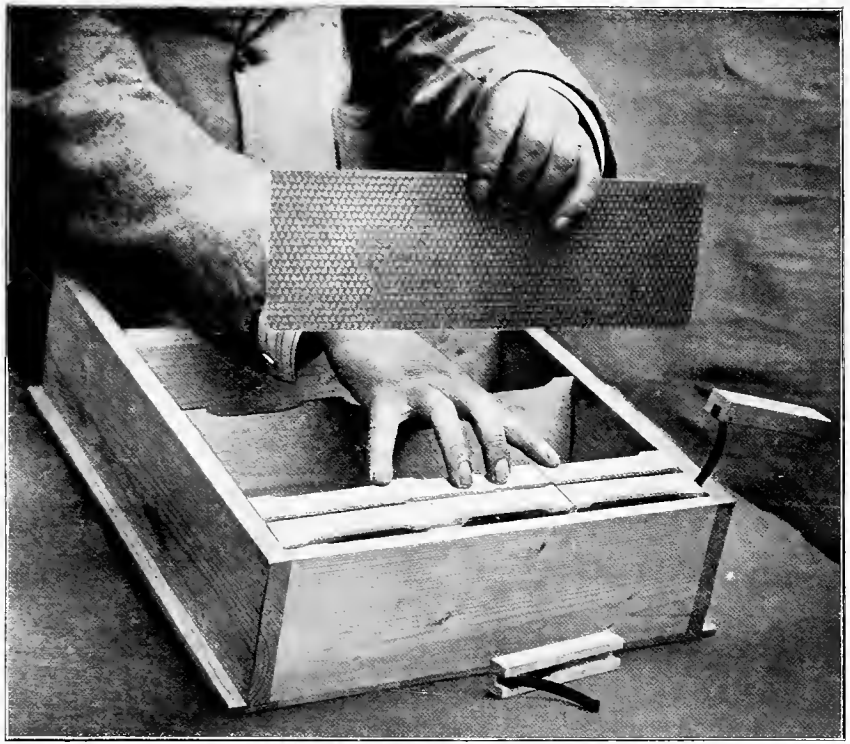

Fig. 34.—Placing Foundation in Sections.

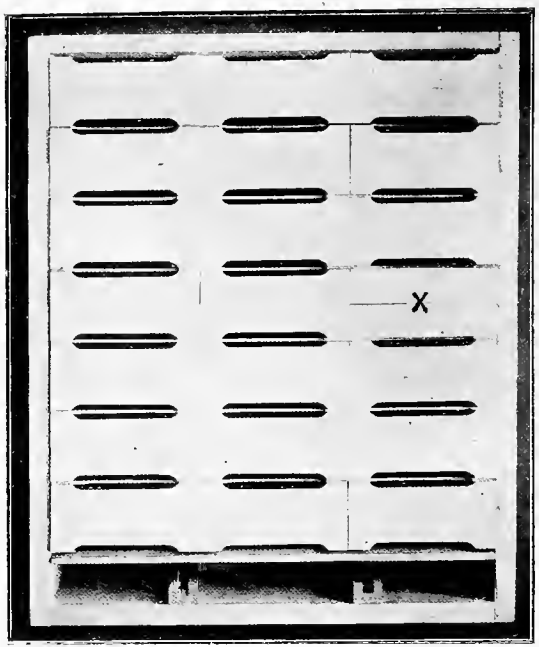

Fig. 35.—Economic Crate filled with "D" Sections.
"X," Section with wrong side up.

FIG. 36.—REMOVING SECTION-CRATE.

FIG. 37.—SECTION OF HIVE SHOWING THREE CRATES OF SECTIONS IN POSITION.

second crate should not be given until it has been ascertained
a further examination that one is required. To place the
cond crate or subsequent crates in position, proceed as fol-
ws :—First, place the lift on the ground just by the hive, and
it place angle-wise, the new crate of sections; then, without
ting the crate which is on the hive, gently twist it from side to
le to insure that it is free; if it is propolised, a knife blade or
rnscrew may be used to free it; then, with the stick in the
bduing-cloth, place it against one side of the crate on the hive,
ize the crate with both hands, gripping the stick of the cloth
th the little finger of one hand (Fig. 36), lift the crate, and in
moving it draw the cloth across the frames and leave it on
em, completely covering them; then hold the old crate just over
t clear of the cloth, so as to drive the bees up into the sections,
d then place it correctly in position on the top of the new
ate, taking care to see that it is so placed as to prevent bees
caping between the crates. Any necessary examination of the
ve should now be made; a new frame of foundation will prob-
ly be required; see brood-spreading (**90**). Then place both
e crates together on the hive and pack them precisely as
plained above for placing the first crate (**110**). It is very
portant that the crates should be well covered with packing
aterial on all sides as well as on the top; if the crates are not
ell covered all round, the outside sections will probably be
completely capped, the honey in the cells failing to ripen
ving to want of heat. A good method of packing two or more
ered crates, is to wind a long strip of flannel, flannelette, or
her suitable packing material, round the sides of the crates,
d to fasten it with twine or pins; then put on the lift, and
mplete packing at the sides and top; the method often adopted
forcing the packing material down between the crates and
t with a narrow lath, is not so effective, and unless very
refully done, the operator is liable to press the crates out of
eir proper position and thus to leave spaces by which heat
d bees may escape. If the weather continues favourable, in
out ten days later a further examination should be made to
certain if a third crate is required. If the back sections of
e upper crate are then crowded with bees, it may be assumed
at a third crate is required; the same procedure should be
opted in placing it. If it is necessary to use the divisional
ate in lieu of an economic crate, it will be found convenient
screw laths to the front and back of the three divisions of
is crate so that it may be used as one crate. If the stock
very strong, and the season is good for gathering honey, it
ay in certain circumstances be advisable to tier up to four or
e crates in a similar manner, but a second lift will be re-
ired for more than three crates. This lift, which may be
rchased, or made locally, should be deep enough to take two
tra crates, and made so that it shall rest on the lower lift as
at lift rests on the body-box, and that when inverted it shall
le over the inverted lower lift, as that lift when inverted
les over the body-box: thus constructed, the sides of the
per lift will be flush with the sides of the roof, and a slip

2 inches by ½ inch should be tacked all round the outside o the base of the roof to hold it in position on the upper lift : similar slip must be tacked on all round the lower edges of th upper lift, so that when in use it shall overlap the lowe lift. The advantages gained by tiering four or five crate together are that :—(*a.*) The bee-keeper can then absent him self for a longer period than would otherwise be possible, wit the assurance that the bees will have space enough for storing (*b.*) The bees will not be disturbed nor irritated by the remova 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 th upper crates. (*b.*) It may be more profitable to market th finished sections at once, rather than to hold them ove (*c.*) The sections may not be so well drawn out and filled, an hence not so heavy as when the storage space is smalle (*d.*) The bees moving over completed sections are likely t spoil their appearance, and thus reduce their market value.

112. Removing Section-crates.

One or more crates of sections may be removed at any tim after the sections have been completel sealed, which may be ascertained as alread described (**111**) by looking to see if the side of the back row of sections next the fol lower are sealed ; if that is so, the crates to be taken off may b removed on the morning of a fine day when the bees are flyin freely, in the following manner :—Remove the crate or crate that are on the hive (**111**) ; then spread a linen cloth free fro holes over the top crate which is to remain on the hive, or on th brood-chamber, as the case may be ; replace the crates removed take off the quilt, replace the roof, taking care to leave no ape ture for light except the cone escape, through which the bee will pass out. The bees should nearly all pass out by the eve ing ; the crates may then be removed, the coverings bein replaced as before. If the honey flow ceases during the summe when crates are on, and may not be expected to come on agai for some time, remove crates which contain complete sections, take out the latter, and make up the crat again with the unfinished sections, adding new sectio as necessary, and either replace the crates on the hiv or hold them over ready for use when the honey flo comes on again ; it would probably be safest for th beginner to replace at least one crate at once. If crat containing completed sections are left on when the honey-flo has so far fallen off as to make the bees cease storing in th supers, the completed sections will probably be more or le damaged in appearance by the bees. The beekeeper must be in mind that if the honey-flow ceases during the ordinary peri of its continuance, it is frequently advisable and sometim essential to supply the bees with syrup to prevent the sto dwindling (**103**). The beekeeper may prefer to let the bees tak down the honey from the supers, but even that supply of fo may be insufficient to maintain a stock at this period. Ma **stocks** have perished from inattention to this matter.

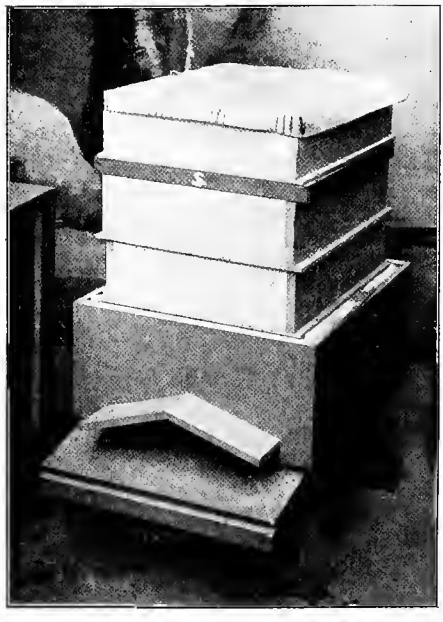

FIG. 38.—SUPER-CLEARER IN POSITION.
S, Super-clearer.

FIG. 38A.—RACK FOR SPACING FRAMES IN DOUBLING-BOX.

113. Use of Super-clearer with Bee-escape.

If it is preferred to use the wooden super-clearer (**41**), act as directed above (**112**), but substitute the super-clearer for the linen cloth under the crate to be removed (Fig. 38). The super-clearer board should be fitted carefully on the lower crate or body-box, with the spring trap of the escape on the lower side of the board. 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 in the roof in the day time. Both may be used together.

114. Treatment of Uncompleted Sections.

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 at some distance from the hive. If wasps or bees have access to the room, close the doors and windows; then take out the sections, put away those that are completed, and replace the unsealed sections in an economic crate, 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 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 in this manner 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.

115. Preparing Divisional Section Crate for Use.

To prepare a divisional section-crate for use, place a "D" section in one division of the crate, with the unsplit side of the section on the bottom of the crate. With the fingers of one hand, open the split in the section sufficiently to permit of inserting the narrow end of a sheet of section foundation (**34**); with the other hand, lower the foundation until it is within one-eighth inch of the bottom of the section, then tightly close the section so that it shall firmly grip the foundation, and with a knife cut off the length of foundation projecting above the section; then place a separator behind the section, taking care to insert it so that the beeways shall be at the top and bottom. Then insert the remaining six sections similarly, and press them together with a follower and spring, as when filling an economic crate (**109**).

116. Using Divisional Crate.

When it is desired to use one division, or two divisions only o a divisional crate, to finish off section they should be placed on the hive in th same manner as an economic crate, bu the space on either side of the crate o crates should be covered with two strips of canvas or othe suitable material, the inner edges of which should be jus caught under the sides of the crate. The crates should, c course, be warmly packed all over, as when using large crates

117. Packing Section-crates.

The bee-keeper must ever remember that success in superin greatly depends upon very thoroughly an carefully packing all round the super crates, so that they may retain sufficien warmth to induce the bees to work i them; it frequently occurs that bees refuse to go up int supers, solely because the covering has been carelessly put on and the temperature of the supers is too low. A little experi ence in supering will indicate to the beginner that the oute sections in a crate are generally the worst, not being so wel drawn out or filled as those in the warmer interior parts of th crate; this clearly indicates the importance of carefully pack ing super-crates, using plenty of material for doing so. Th bee-keeper, when giving a fresh crate of sections to a hiv which is carrying a super, must never place the new crate o empty sections on the top of the old one; it should invariabl be placed immediately over the brood nest, with the olde crates above it. This practice will give the best results.

XIV.—WORKING HIVES FOR EXTRACTING.

118. Extracting versus Sections.

Extracting signifies the operation of removing honey from th comb by a centrifugal machine, whic leaves the empty comb in a fit conditio to be returned to the hive that it may b refilled by the bees. Hives may b worked for extracting as an alternative to, or in conjunctio with, the production of section honey. It is not advisable t work for extracting when there are less than four stocks in a apiary. The relative merits of the two systems of producin honey may be shortly summarized as follows.

The advantages of extracting are :—

(*a.*) Greatly increased honey production; a stock whic would on the average produce 60 lbs. of section honey would probably produce 100 lbs. of extracted hone per annum.

(*b.*) Cheaper production of honey per pound, neither sec tions nor section foundation, and less brood foundatio being required.

(*c.*) Very considerable reduction in the cost of forwardin to market, due to the fact that extracted honey can b easily and cheaply packed to bear transit withou 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; comb honey deteriorates greatly in a cold temperature, say below 55° F., and is then liable to granulate.

(*e.*) It facilitates the management of an apiary, and when properly worked is probably the most effectual method of preventing swarming.

The disadvantages of extracting 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**), and a box (**53**), to hold frames, the whole costing about £2.

(*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.

(*d.*) In many districts the demand for extracted honey is not so great as for section honey.

119. Preparation of Stocks for Extracting.

It will be assumed that the apiary consists of four stocks (**118**), and that it is proposed to work two of these for extracting, and two for sections. Early in March select the two strongest stocks for extracting; other things being equal, the preference should be given to Italian bees, pure or cross-bred, as they excel as honey gatherers, but are not as good as the English bee for making wax, and are very inferior to the latter for capping cells. Stimulate (**106**) 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 brood, brush all bees off, and place one of these frames in each hive which is to be worked for extracting.

120. Placing Doubling-box.

When the stocks for extracting are ready for supering (**108**), or better, a few days before they are ready for supering, treat each hive that is to be worked for extracting as follows :—Remove the hive from its stand, and place a clean empty hive on the stand, uncovering it. Place the doubling-box (**31**) of the new hive on a sheet or board next the old hive. Now transfer from the brood-chamber of the old hive, to the doubling-box of the new hive, 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, and not transferring more than eight frames in all at this stage. If the stock is very strong, on eleven frames, and well supplied with brood, it will frequently be possible to transfer eight frames; but if the

weather has not been favourable for increasing the stock, it may be best not to transfer more than six to the doubling-box. Then transfer all the remaining frames, say three or five in number, to the body-box of the new hive, and also place with them as many frames of wired foundation as is necessary to make the total number of frames in the body-box correspond with the number of frames which have been placed in the doubling-box, taking care so far as possible to alternate the new foundation frames with the old frames; this number of frames is necessary, in order to provide room enough, to help to maintain the warmth of the brood frames in the super and for other good reasons; also make sure that the queen is on one of the frames in the body-box. Next cover the frames in the body-box with a sheet of excluder zinc (**48**), and over this fit the doubling-box in position on the body-box, so that the frames in the doubling-box shall be parallel to those in the body-box. As a sheet of excluder zinc covering the frames all over greatly obstructs the workers in passing to and from the doubling-box, many good authorities prefer to use sheets cut to allow a space of about one inch all round, up which the bees can pass freely, whereas the queen, keeping rather to the centre, is unlikely to find her way up. When the frames are pressed forward in position, the dummy in the doubling-box should hang over the dummy in the body-box; then pack all round and over the doubling-box with woollen or other cloths, as when packing section-crates (**111**). It is to be understood that 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 in the spring (**190**), this being a convenient time for transferring the stock to a fresh hive. If, however, the stock has already been transferred to a clean hive, it will of course only be necessary to remove frames as above directed from the body-box to the doubling-box.

121. Further treatment of Stocks worked for Extracting.

As the brood in the frames transferred to the doubling-box hatches out, the bees will fill the cells with honey, as probably they will all have been emptied of brood by the time the full honey flow begins; the frames in the doubling-box should then be spread to a distance of two inches from centre to centre, first extracting the honey from any capped frames which should then be replaced; it will assist the beekeeper in spacing the frames and closing the spaces between the shoulders, to use a wooden spacing rack, as shown in Fig. 38A. 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. It is best, however, to keep only eight frames in the super, unless more frames taken from the body-box or from other hives must be added in order to finish them for extracting.

122. Removal of Frames for Extracting.

The bee-keeper should endeavour to remove at least twelve frames for extracting at one operation. 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 extracted. In good clover districts, if the season is good, frames would probably be ready for extracting about the middle of June. When it is believed that some frames are probably ready for removal from the super, the beekeeper should examine them, removing the quilt from the back frames, and putting the carbolic cloth 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 carbolic 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 brush 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 of removing frames for extracting, say three weeks after putting the super 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 beekeeper should take one or two of the best-filled frames of brood from any hive which is being worked for sections 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 (**63**) 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 super; 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 in the centre; then replace the excluder zinc and super. Next, place in the super as many empty frames of comb as are required; it should not now carry more than eight. If no empty frames are available, replace the super 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 super. When adding empty frames to the super, first draw the partially completed frames to the back of the super 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 super.

When working hives for extracting, the greatest care should
taken to avoid doing anything which m
123. Precautions against robbing when Extracting. conduce to robbing (**141**); empty fram
should not be returned to the super un
after the bees have ceased flying. Fram
of comb, whether containing full or emp
combs, should never be left about uncovered, but should
kept covered in the frame-box or some other suitable place.

XV.—EXTRACTING.

This operation should be performed in a room at a distan
from the apiary; the door and windows
124. Extracting. the room should be closed, or other mea
should be taken to prevent the ingress
bees. There should be a fire in the room to keep the extract
warm if the temperature is cool. The honey should be extract
from the frames as soon as possible after their removal fro
the hive; if they are cooled, the honey will thicken, renderi
its extraction difficult, and increasing the liability of breaki
combs. The following articles should be in readiness in t
extracting room:—The extractor (**49**), ripener (**50**), strair
(**51**), two uncapping-knives (**52**), or one uncapping-kn
and one table knife which should be kept in a jug of h
water, a wooden table, one or two large earthenware or en
melled iron dishes, and a tin or galvanised iron or wooden pail
about 1½ to 2½ gallons capacity, with a wooden lath laid acr
its mouth and tied to the handle lugs on each side. If the e
tractor has not been used before, or has not been thorough
cleaned out since use, scald and rinse it out with two or thr
gallons of boiling water to clean and heat it; in any case
must be rinsed out with hot water to heat it. Take a frame o
of the frame-box, and hold it by one shoulder in the left han
resting the opposite lower corner on a dish, and with the kn
in the right hand, cut upwards from the bottom with a sa
ing motion, thus paring off the cappings, which after a lit
practice can be cut off in sheets quite dry. When two fran
have been uncapped, place them ends up in the extrac
cages, and turn the handle so as to revolve the cages, slow
at first, but increasing the speed until it is just sufficient
cause the honey to be flung out of the cells; after revolving
extractor for one minute, most of the honey will have be
removed from the outer side of the combs; the frames sho
then be reversed in the cages, and the operation repeated
clear the other side, revolving the cages a little faster th
before, until the combs are quite clear. If on lifting
frames they are found to contain honey in the side f
extracted, they should be again reversed in the cages, wh
should then be revolved more rapidly than at first, until all
honey has been extracted. The reason for not completing
extraction of the first side in one operation, is to avoid the p
sibility of the comb being broken by being too rapidly revol

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. A convenient method of working the extractor, is to attach one end of a cord about eight or nine feet long to the crank handle, and the other end to a little piece of stick which is held in the hand; by alternately pulling and slackening the cord, the frame can be made to revolve. When extracting is over for the day, the extractor should be placed on a table or stand of such a height that the ripener, with the strainer on it, can be placed under the tap of the extractor, the honey in the extractor should then be run off through the strainer, in which it should be left for a few hours; 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 room at a temperature of 80° F., under which conditions most of it will ripen; any which does not ripen may be kept for feeding bees. The ripener should then be carefully covered, and the extractor and strainer should be cleaned, scalded, and covered to exclude dust, insects, &c. As the extractor recommended for use (**49**) will not hold more than from 60 to 90 lbs. of honey below the cages, it is not advisable to bring in more frames than will yield that amount, as the honey in them would thicken if they were held over for a long time. Frames hold from 4 to 6 lbs. of honey, according to the width to which they are drawn out. When extracting is done late in the season or in cool weather, the extractor and uncapping-knives must be kept warm, the former by placing it in front of the fire and turning it a little from time to time, the latter by placing them in hot water. 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 are more expensive than the latter, hold less honey, and are not interchangeable with them, they are not recommended. After frames have been extracted, those which are to be returned should be replaced; if not immediately required, they may be kept hanging vertically for a few days, but as they would soon mildew, they should, if not required for any hives, be placed hanging vertically in a covered box fitted with an opening for the bees, and this box should be placed at a considerable distance, if possible not less than 200 yards, from the hive, in order that the bees may clear the frames of honey. If foul brood is prevalent in the district, great care should be exercised not to use an extractor which has been used in other apiaries, without first ascertaining beyond doubt that no foul brood existed in any of the apiaries at which it was used; 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.

125. Preparing Stocks for Winter.

Successful wintering largely depends upon stocks being strong and having a sufficient food supply; therefore, when supers have been removed, the 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 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**), or if that is not available, a frame of foundation. If less than eight, but not less than six frames are covered with bees on both sides stimulative feeding should be resorted to (**106**), 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 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. Then, select eight frames on which to winter the stock, choosing those which contain most honey; 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 when spreading brood 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 pounds of honey for wintering, to insure which the eight frames on which it is to winter should weigh 25 pounds gross; if they fall short of this weight, the stock should be rapidly fed on the eight frames selected for wintering, until these frames are brought up to the full weight of 20 pounds (**104**). If sufficient frames containing honey cannot be provided, one or more frames of empty drawn comb should be inserted before feeding.

126. Time to Feed for Winter.

The honey stored by the bees for winter food should be ripe enough for capping by the middle of October in late districts, and earlier in early districts; the period for rapid feeding 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. It is therefore obvious that in the case of weak stocks, supers should be removed, even in districts in which there is a late honey flow, in the beginning of September, and earlier in other districts, to permit of the honey stored for winter food being capped. Uncapped honey would not keep sound, and the bees cannot obtain capping material late in the year.

127. Feeding with Candy.

If the proper supply of 20 pounds of honey has not been stored and capped in sufficient time (**126**), the deficiency in weight should be made up by supplying a corresponding weight of soft candy; if the stock is on less than eight frames, this candy may be given in a frame near the centre of the cluster; but if only a small quantity is required, a cake of the requisite size may be 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 on the frames, glass side up, the bee-keeper can at any time see how much has been consumed.

128. Objections to Wintering on Full Number of Frames.

Some bee-keepers advocate wintering bees on ten or eleven frames; this method is objectionable, because although the total food supply may be sufficient, yet, owing to its being distributed all over the hive, bees may perish from starvation when there is plenty of food in the back frames, because of their disinclination to move from the hive centre when in the semi-torpid condition in which they remain during cold weather.

129. Winter Coverings.

The frames on which the bees are to winter (**125**) should be pushed to the front with the dummy. Two pieces of wood about 6 inches long and from $\frac{1}{4}$ to $\frac{3}{8}$ inch thick, should be laid across the centre of the top bars of the frames about $\frac{3}{8}$ 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 or chaff, 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.

130. Securing Hive for Winter.

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 two to three inches apart; the floor-board ventilator should be kept open, except during very cold weather. 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 Willesden paper, zinc, or corrugated iron. 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; the doors should be closed to about two to three inches apart before evening.

XVII.—UNITING.

131. Reasons for Uniting.

Strong stocks are always more profitable than weak stocks; the bee-keeper should therefore at all times endeavour to maintain stocks as strong as possible. 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 be performed when bees have ceased flying for the day.

132. Uniting Two Swarms.

To unite two swarms on the day on which they issued, or the day after, prepare a hive for their reception (**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 case of accident befalling the other queen; dust the bees in each skep or swarm-box with flour; this may be conveniently done by placing the flour in a very small bag of coarse canvas and lightly dusting the bees while turning the skep or swarm-box about so as to expose them all to the falling flour; then throw the contents of each skep or swarm-box together on the floor-board, and the bees will pass into the hive. 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 floor-board. If it should occur that both the swarms issued from three to eight days before being united, and that they had been placed in positions more than ten yards apart, they should be brought close together (**182**), this move being completed all in one operation; it would then be advisable to place some obstruction immediately in front of and within three feet of each hive that has been moved, to attract the attention of the bees as they leave the hive, and induce them to take bearings of its new position; a barrel, or a cloth on the back of a chair, would serve the purpose; after having been left for about forty-eight hours in the new position, they may be united as above described. The reserved queen may be destroyed, when it is known that the other queen has been accepted.

133. Uniting Two Stocks which are in Bar-frame Hives.

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**), and the other queen should be caged (**151**) to avoid risk of the bees balling her during uniting operations. Then crowd the bees in each hive upon as few frames as possible; 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 remove all frames, but leave the dummy in. Give a few strong puffs of smoke to each stock; after three minutes uncover, and place carbolic cloths (**65**) over the frames in each hive. Then lift the back frame of one stock, and while holding it with the top bar horizontal, thoroughly dust the bees on both sides of the frame with flour (**132**), and then 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 empty hive. When all frames have been removed from the old hives, any bees remaining in them should be dusted with flour and then shrown out together on the floor-board. Now introduce the cage containing the queen, and attend to instructions for doing so (**152**). If any fighting is observed, puffs of smoke should be driven amongst the bees to quiet them; this should be continued until the bees have been thoroughly quieted. The hive may 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. 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.

134. Uniting a Swarm to a Stock in a Bar-frame Hive.

To unite a swarm to a stock in a bar-frame hive; first subdue the bees in the bar-frame hive (**65**), then taking each frame by itself, jerk the bees off into an iron bucket or some other suitable vessel, dust with flour (**132**) any bees left on the frames or in the hive, and all the bees that have been removed from the frames, revolving the bucket containing them so as to expose all the bees to the dusting operation; treat the swarm similarly; then throw one lot of bees into the other, shake them up, and throw the entire lot on a hiving-board placed in position against the bar-frame hive (**75**). If both the swarm and the stock have queens, one of the queens should be removed (**151**) before the bees are united; this should preferably be done from twelve to twenty-four hours before uniting, so that the bees may have ascertained that they are queenless and therefore the more readily accept the queen of the stock to which they are to be united. If necessary, additional frames should be provided for the extra bees.

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 (**82**), 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**), then hive them (**76**).

137. Points to be observed in Uniting Operations.

Always unite in the evening, after bees have ceased flying. If the bees that are to be united are short of food they should receive some thin warm summer syrup (**178**), immediately before uniting operations are commenced. This may be poured over the top bars and allowed to trickle down the frames, or if the bees are in a combless skep the syrup may be sprinkled over them. 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.

XVIII.—WAX EXTRACTING.

138. Wax Extracting.

Beeswax is worth about 1s. 4d. per pound; from each bar-frame hive worked for sections there would probably be three-quarters of a pound of wax per season, and rather more if worked for extracting (**118**). The economical beekeeper should therefore preserve all old comb, cappings, and scraps of foundation, to be melted down for 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.

139. Extracting Wax by Rendering.

To extract beeswax by rendering, provide an iron pot of about eight gallons capacity; make a bag of coarse open texture canvas 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. Break or crumble the comb which is to be dealt with into a small tub containing luke-warm water, rejecting any comb which contains brood; then gather the fragments of comb lying in the water, press them into large lumps, place the lumps in the bag, tie the mouth of the bag securely, place the bag in the pot, letting it rest on a piece of wood or a plate to prevent its being burnt, place a heavy 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 for about two hours, after which cool; a cake of wax of fairly good quality will form, and float on the water; remove any dross adhering to its under surface, then break it up and place it in a bowl containing a little water, and 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 in an 8 gallon pot; more could be dealt with by using a larger pot.

XIX.—ROBBING.

140. Robbing,

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

141. Causes of Robbing.

The principal causes of robbing are as follows :—(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 hive, 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 close to, say within fifteen feet of 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 $\frac{3}{8}$ 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 carbolic solution (**180**) on the alighting-board; 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 3 inches long, $\frac{1}{2}$ inch wide, and $\frac{3}{8}$ inch high, fitting close against and covering the entrance; the tunnel may be made of wood, or tin, 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 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.

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

144. Necessity for Re-queening Stocks.

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 never be retained longer. It may also be necessary to re-queen for any of the following reasons, viz., the queen having been rendered practically useless, through accident or injury (many queens are killed or injured when frames are carelessly or roughly moved); loss of queen when on nuptial flight (**6**) owing to her being seized by a bird, falling into grass, failing to recognise hive on return (**68**), or for other reasons.

145. Queenlessness.

The signs that a stock is queenless are as follows:—On the first day after losing their queen, the bees run about in a bewildered, agitated state, in and out of, and over, the hive, this commotion being most observable in the early morning, before the bees are flying. After this they quiet 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 $\frac{3}{8}$-inch wide to prevent robbing (**140**); examine the hive when other bees are not flying, and if there is no queen, or 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.

146. Providing Queens.

When a fresh queen is required for any of the reasons stated (**144**), she may be procured from another apiary, care being taken to select one from a stock which is unrelated to the stock for which she is intended, or the bee-keeper 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 beekeeping. Frequent change of blood is as essential in apiculture as in stock breeding, therefore it is most desirable that a queen obtained from an unrelated stock should be introduced at least every alternate year, and 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.

147. Preparing for Queen Rearing.

In the autumn before the season of queen rearing, procure a queen from an unrelated stock (**146**), and introduce her into a stock selected as suitable for producing queens; this stock should be well furnished with good fresh worker combs, and should be in thoroughly good condition for wintering; if such a queen has not been procured, select the most suitable stock for queen rearing, having regard to the instructions in paragraph **146**; remove all drone comb from this stock, which may be called stock "Q"; select another suitable stock for drone rearing; this will be referred to as stock "D." Stimulate (**106**) and spread brood (**90**) in the spring, so as to bring these stocks forward as much as is desirable, with a view to having stock "Q" in swarming condition before any other stocks in the apiary, and to have drones flying from stock "D," a few days before the queens are expected to hatch out in stock "Q"; recollecting that a period of thirty-five to forty days must elapse from the time the egg is laid until drones fly freely. A frame containing as large a proportion as possible of drone comb, should be placed in the centre of the brood nest of stock "D," when breeding commences, to encourage drone production. The stock "D" may be moved (**182**) to where the nucleus hives (**57**) will afterwards stand, and it is advisable that they should be placed a little apart from the other hives, and facing a different aspect, if that can be conveniently arranged. This spot should be clear of the line of flight from other hives.

148. Forming Nuclei from a Swarmed Stock.

If the instructions given (**147**) have been carried out, drones should be flying from stock "D" before stock "Q" is in swarming condition. When stock "Q" swarms, hive the swarm as described in paragraph **95**. Then move the parent stock "Q" to 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, and to which stock "D" has possibly already been moved (**147**); then transfer the frames from stock "Q" to the nucleus hive or hives (**57**), using three or four 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 three 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 drones in stock "D" should be flying now, and the young queens should be mated by them; 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. To insure that the young queens reared in nuclei shall be mated by selected drones, any drone comb appearing in other hives than the one set apart for drone breeding should be removed. Capped drone brood may best be got rid of by cutting the comb off flush with the surface of the worker comb; the bees will dispose of the remains.

149. Providing additional Nuclei.

If it is desired to provide additional nuclei to accommodate all the perfect queen cells in the nuclei formed 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 off 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 hay at the entrance; 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 a queen cell from 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.

150. Management of Nuclei.

Keep the nuclei well covered, to conserve heat. Attend to feeding, giving syrup if necessary (**103**), or better, give a frame of sealed food from a stock that can spare it. If the young queen in a nucleus hive is not mated before all brood has hatched out, there is a danger that the bees in the nucleus hive may abscond with her; to provide against this contingency, give a frame containing unsealed brood before all the brood in the nucleus has hatched out. 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: on the following day a capped queen cell or a brood frame containing a queen cell may be introduced for the purpose of providing another queen.

151. Caging Queen.

There are many good queen cages; it will suffice to describe the use of one, the "Abbott" cage (**55**); 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. 39), insert her in 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.

152. Introducing Queen to Stock by Cage.

Although an aged or defective queen should be replaced by a young mated queen as soon as possible, the best time for general re-queening of stocks is the autumn. There is considerable danger of bees objecting to a queen, and killing her by "balling" her, that is surrounding her and hugging 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 through without rubbing. The cage should rest against some sealed honey store, which should be slightly scraped so that the caged queen may feed if necessary. Introduce the queen in the evening, and release her in from thirty-six to forty-eight hours. Before introducing her, 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 some days, give it a frame of brood the day before

FIG. 39.—HOLDING QUEEN.

ıtroducing the queen, and keep her caged for two days. ıxamine the stock a few days after introducing a queen, to ıscertain if she is all right. The best time to liberate a queen ıat is caged in a hive is after dusk.

If the dome cage (**55**) is used, get the queen into the cage, lace the latter on a card, and then lay the card on the ɔmb of a frame taken from the centre of the hive in which is proposed to introduce her, laying the frame horizontally ɔr that purpose, and uncapping a few of the cells of honey ıat will be under the cage: then carefully withdraw the card, ıd while taking great care not to injure the queen, screw the ıge into the comb to the depth of the cells; leave it thus for ɔrty-eight hours, and then release the queen; after doing so, ·atch her closely, and if the bees attack her, cage her again ıd leave her for twenty-four hours longer, after which she ıay be released.

153. Direct Introduction of Queens.

ıs 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, and that the queen has been fasting for at least half-an-hour. Place the queen in an ordinary chip box for ɔlding wooden matches; after dark, lift one corner of the quilt, lace the match box over the space between two end frames, so ıat when the box is pushed open the opening will be next the ·ames; push the box open, and the queen will move quietly ıto the hive; cover up and leave the hive undisturbed for two ays. Endeavour during this operation not to disturb the bees, ıd if they should be disturbed, postpone the introduction of ıe queen, unless a smoker can be used at once to drive down ıe bees, before the queen is introduced.

154. Sending Queens by Post.

ɨees may be safely forwarded by post in boxes made for the purpose, accompanied by a few workers and a supply of food. The style of box illustrated (Q, Fig. 17) is very suitable; it consists of a piece of wood 4 inches long by inches broad by $\frac{3}{4}$ inch thick, in which two holes of $1\frac{1}{4}$ inches ıameter are bored to a depth of $\frac{1}{2}$ inch, the holes being 1 inch part from centre to centre; two smaller holes $\frac{3}{8}$ inch in ıameter are bored to the same depth at the end of and opening ıto one of the large holes; the box is covered with a lid of erforated zinc, secured at one end by a tack. When required ɔr use, a mixture of honey and fine white sugar should be laced in the small holes, the queen is then placed in the large ɔace with six or eight workers, the cover is tied in position, ıd thus secured the box may be forwarded by post without any ırther covering. For instructions as to catching queen see aragraph **151**.

155. Wintering Spare Queens.

As it is always advisable to have on hands spare fertile queens any that are not required at the end of the season may be wintered on four or more frames placed behind the dummy of a stock hive; these frames should be well crowded with bees, and fully two-thirds of two of them, and at least half of the others should be filled with sealed stores; in addition to which two pounds of soft candy should be supplied (**127**), (**174**). An entrance should be made at the back as for nuclei (**57**), and a little tin porch should be fitted over it.

XXI.—STORING AND MARKETING HONEY.

156. Grading and Storing Sections.

When it is intended to sell honey, the sections as removed from the hive should first be cleaned by scraping the wood to remove any wax or propolis adhering thereto; they should then be graded into classes as follows:—First class sections should weigh 16 ounces, 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 class sections should correspond to first class sections, except that the weight may fall as low as 14 ounces, and the other conditions need not be so thoroughly fulfilled. All other sections may be regarded as third class, and such as will sell only at a low price. Having graded the sections, all of first or second class quality should be neatly wrapped in wax paper (**159**), and put away in a dry warm room until sold. It would be well to pack them in cardboard or other suitable boxes.

157. Grading and Storing Extracted Honey.

Extracted honey may best be stored in tins holding about 56 lbs., fitted with close-fitting lever lids (Fig. 47). 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 room until sold.

158. Covering Sections.

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.

159. Wrapping Sections in Wax Paper.

Wax paper for wrapping one pound sections, cut into proper sizes, about 12½ inches by 7¼ inches, is sold at about 6*d.* 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

FIG. 40.—WRAPPING A SECTION.

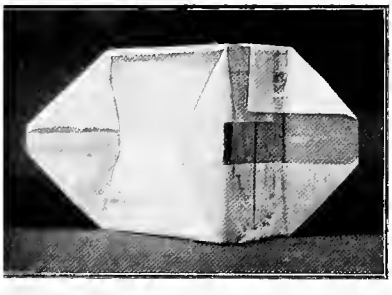

FIG. 41.—WRAPPING A SECTION.

FIG. 42.—WRAPPED SECTION.

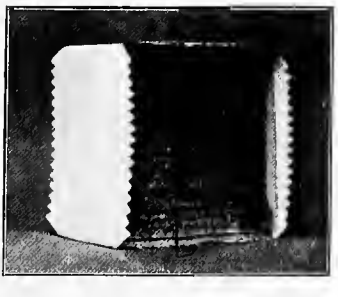

FIG. 43.—SECTION PREPARED FOR GLAZING.

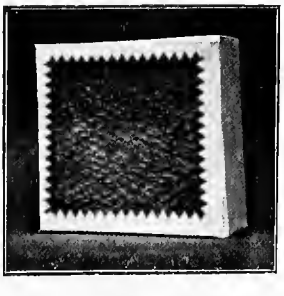

FIG. 44.—GLAZED SECTION.

Fig. 45.—Method of Packing Sections for forwarding by Post.

Fig. 46.—Sections Packed for Forwarding by Post.

Fig. 47.—Tin for Extracted Honey, and Case for Holding Tin when Forwarded by Rail.

sheet may be folded over it as shown by Fig. 40, leaving equal margins of paper on either side of the section; apply paste to the three exposed sides of the section, and fold the paper over it as shown in Fig. 40, pressing the paper firmly down on the paste 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 of the paper already stuck to the section; then fold the projecting margins of the paper as shown in Figs. 41 and 42, and fix them neatly in position with paste. If a label is used, it should be placed 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.

160. Glazing Sections. If sections are to be glazed, provide squares of the lightest glass procurable, cut $4\frac{1}{4}$ inches by $4\frac{1}{4}$ inches, costing about 2*s.* to 2*s.* 6*d.* per 100 squares; provide also slips of suitable paper of any approved colour 18 inches long by $2\frac{3}{4}$ inches broad. Coat one slip of paper with paste, place the section on it at $\frac{1}{2}$ 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. 43); 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. 44). If 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 6*d.* to 7*d.* per 100 slips.

161. Marketing Honey. Parcel Post Crates. When small quantities of sections are to be forwarded, a good method of packing them is to use the cheap travelling crate (Fig. 46), 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 twelve pieces of sawn plaster lath, cut to $17\frac{1}{4}$ inches long. 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 then be packed, separators made of wood or cardboard, $4\frac{1}{4} \times 4\frac{1}{4}$, being placed between each pair of sections, and care being

taken to see that the straw wisps thoroughly protect each section, and that the straw packing is sufficient to prevent any movement (Fig. 45). The whole should be further secured by cord (Fig. 46). If desired, several crates thus packed might be enclosed in one large crate to be forwarded by rail. In all cases care should be taken not to forward sections by post or rail unless they are firmly attached to the wood on all sides.

162. Packing Sections for Forwarding by Rail.

When sections are to be forwarded by rail, a good method of packing is to place them in cardboard boxes holding one dozen sections, and then to re-pack these boxes in large boxes or crates. Suitable cardboard boxes for holding twelve sections, cost about 1*s*. 6*d*. per dozen. The larger outer cases should be lined with straw.

163. Packing Extracted Honey for Forwarding by Rail.

Extracted honey may be conveniently forwarded in bulk in tins holding about 56 lbs. (Fig. 47). Such tins, with lever lids, cost about 1*s*. 6*d*. each, and should be packed in wooden crates or cases, also costing about 1*s*. 6*d*. each. Extracted honey forwarded in glass jars should be very carefully packed, to provide against breakage.

XXII.—CHILLED BROOD AND FOUL BROOD.

164. Chilled Brood.

Chilled brood, that is to say brood which has been killed by cold, may be produced by any cause which results 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, especially 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, or by otherwise exposing the brood nest to cold. Chilled brood may be distinguished from foul brood, in that chilled brood has no appreciable bad odour, and becomes first greyish and then black, whereas foul brood has a markedly disagreeable putrid odour, and becomes first a dirty cream and then a dark brown colour.

165. Foul Brood.

Foul brood, which is caused by a "germ" known to scientists as *Bacillus Alvei*, 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 unsound to healthy stocks, it is not only a very destructive, but a very troublesome disease, so that it behoves bee-keepers to exercise the greatest vigilance in order to keep their apiaries free from its attack. 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 certain spread to the remaining stocks in the apiary, and eventual lead to the ruin of all. It is, therefore, most important th every precaution should be taken to prevent its introductio and every effort made to secure its eradication wherever it h appeared.

The commonest causes of foul brood infection are :—

166. Sources of Infection.

Healthy stocks robbing diseased stock Individual bees, when foraging for hone taking honey from the bodies of be which have died from the disease. Th supply to bees of honey or combs from diseased hive. The transfer of frames from a diseased to healthy hive. Neglect on the part of the operator to thoroughl disinfect such parts of the body or clothing as were expose or appliances which were used, when manipulating a disease hive. The acquisition of infected swarms or stocks.

Amongst the conditions that are specially conducive to th development of the disease, mention ma be made of the following :—

167. Conditions favourable to Foul Brood.

Damp and closely sheltered situation especially where the hives are much ove shadowed by trees. Dirty hives. Badly ventilated hives. Hives which are not weatherproof.

When a frame of brood is taken from a healthy hive, it is foun to contain near its centre, a more or les

168. Symptoms.

circular patch of brood. The cells con stituting this brood-patch will contai small grubs or larvæ, the best developed of which will pre sent a plump, pearly-white appearance as they lie curled u in the shape of the letter " C " at the bottoms of the cells (Fig 3). But when the disease is present, particularly in its mor advanced stages, these larvæ will be seen lying in various posi tions in the cells—often with their backs up ; they will also b flabby in appearance and of a pale yellow colour, grad ually turning to a pale brown hue as they shrivel up an die. The capping of healthy brood is usually flat o very slightly raised, rarely sunken; that of disease brood, on the other hand, is usually indented, frequentl perforated, and generally much darker in colour (Figs. 48 and 49). When uncapped, these diseased cells are found to contain sticky coffee-coloured substance somewhat of the consistency o rubber solution or semi-liquid glue. Care must be taken not t mistake " chilled brood " (**164**) for foul brood. As the disease develops, the infected cells emit a fetid odour, which is readil discernible on opening the hive ; when the attack has reache an advanced stage, this odour becomes so pronounced tha it can be distinguished even before the hive is opened Though it is thus easy to determine the existence of th

disease in its more advanced stages, its identification at an earlier date frequently proves a matter of some difficulty. In its earliest stage the attack may be confined to one or two cells in a frame, and if infection is suspected, very close examination may be necessary in order to enable the owner to decide if the disease is present. Bee-keepers should be on the watch for the slightest appearance of infected brood in the earlier stages of the disease, as much of the success attendant upon the adoption of curative measures depends upon the early application of the remedies employed. Before proceeding to discuss the methods of treatment to be employed in dealing with this disease, it may be well to point out that the curative measures recommended should be resorted to only during the period extending from March to October.

XXIII.—CURATIVE TREATMENT OF FOUL BROOD.

169. Very Mild Attacks.

If the attack of Foul Brood is a very mild one, and not more than ten or twelve cells on each side of a frame are infected, the best course to adopt by way of treatment, is to wash out each diseased cell with pure formalin, using for this purpose a small glass syringe, which can be bought for about sixpence. If a syringe is not available, the formalin may be dropped into the cells with a quill or wooden match, but care should be taken to avoid dropping any of the liquid into healthy cells. After disinfection in this manner, the dead larvæ may be removed from the cells with a match or a pointed piece of wood and then burnt, and afterwards the floor board of the hive should be covered with a thick calico cloth, previously saturated with a formalin solution consisting of

1 part formalin,
7 parts water.

The cloth thus put on should be re-saturated with the one-to-seven formalin solution at intervals of about a week, until there is reason to believe that all trace of the disease has been removed.

170. Mild Attacks.

If the attack is more severe than that just described, but if not more than half the brood in the frame is involved, the following course of treatment should be adopted :—Procure a suitable lamp for the gasification of formalin tablets; the lamp illustrated in Fig. 50, costing 5*s*., is sold by Messrs. Fletcher and Phillipson, 10, Lower Baggot-street, Dublin; also procure a few formalin tablets, costing 1*s*. per box of twenty, and one ounce of paraform powder, costing about 1*s*., all of which can be obtained from a druggist. Place the hive in a room, or else so shelter it, that the fumes from the lamp will not be blown away, when the lamp is in use. If the hive floor-board is

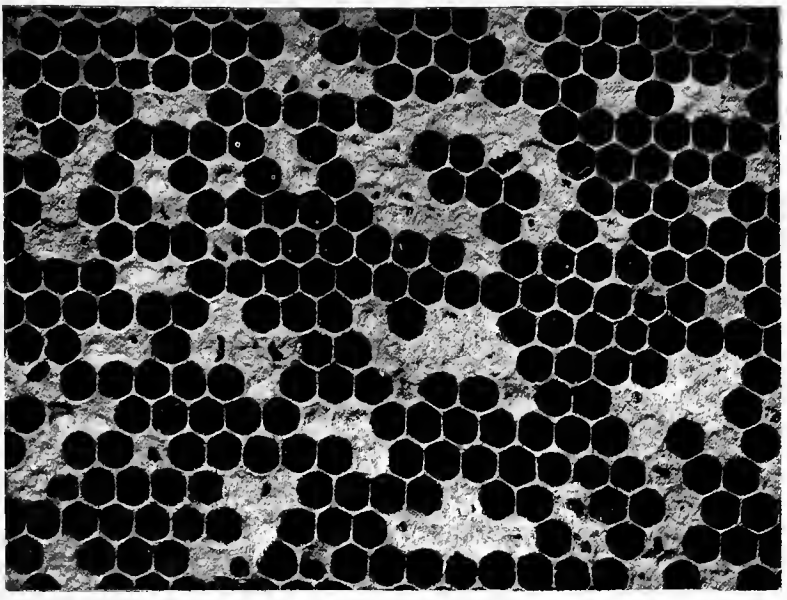

FIG. 48.

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.

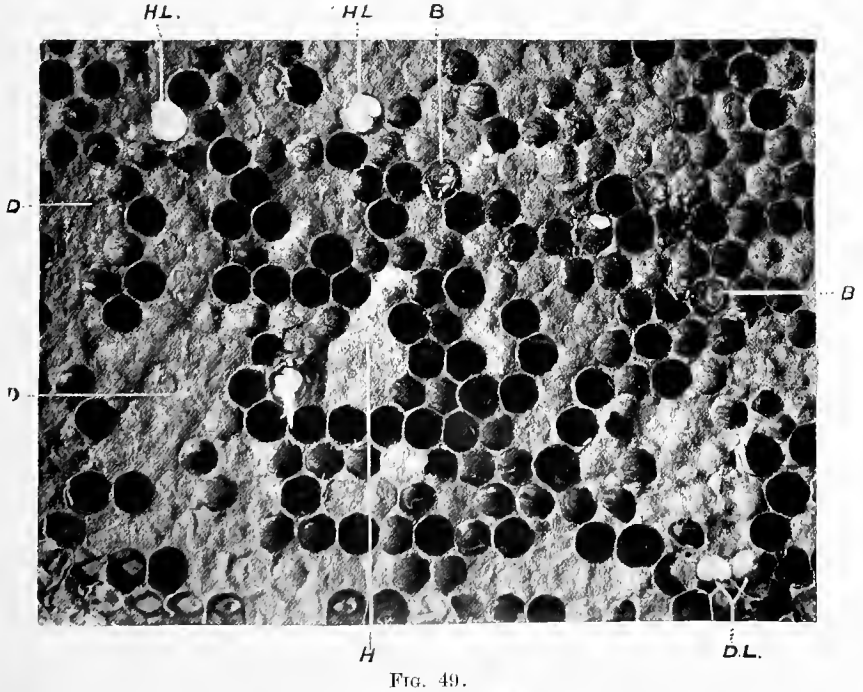

FIG. 49.

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. 50.

Fumigating lamp, price 5s., supplied by Messrs. Fletcher and Phillipson, 10, Lower Baggot-street, Dublin, for fumigating beehives with formaldehyde solutions. The receptacle for holding solution or tablets is shown resting on a piece of glass on the top of the fumigator case.

FIG. 51.—HIVE PREPARED FOR FUMIGATING.

fitted with two ventilating holes, stop up one; if it has no such holes, make one about four inches in diameter, a little in front of the centre of the floor-board, and cover it on the upper side with perforated zinc (Fig. 4). Remove the hive from the floor-board; place the floor-board on bricks or other supports at a sufficient height to permit of the fumigator being placed under it; then on the floor-board place a spare body-box of the same size as the one in use, and on this replace the hive, fitting the body-box of the diseased hive on the top of the spare body-box and pasting a strip of brown paper over their points of contact (Fig. 51). If section crates are in use, leave them on; if no such crates are on, put on two, containing sections filled with strips of brown paper in lieu of foundation. Remove all covering except one light quilt, and leave the roof on. Make the hive entrance air-tight by packing. Now put one formalin tablet in the fumigator receptacle. See that there is a good supply of methylated spirit in the lamp receiver, and that the lamp wick is regulated to give a fairly strong flame. Next, place the fumigator in position under, and closely wedged against the floor-board hole, so that all the fumes shall pass into the hive. Use white lead or putty to make an air-tight connection between the lamp and the floor-board; then light the lamp and let it burn for five minutes, after which extinguish it. When it is noticed that the formalin fumes are coming out through the roof cones and ventilator, these should all be made air-tight by covering them with white lead or putty. Leave the hive thus for six hours, then open the door and all ventilators, and replace the hive in its normal condition. Next saturate the floor-board with about half a gill of a solution of 1 part of formalin to 7 parts water; then find the queen, and place her with three new frames of empty drawn comb and as many bees from the hive as will cover them, behind an excluder dummy; if there are no frames of empty drawn comb, give two frames of foundation. Remove any frames having no brood, and either burn them, comb and all, or if preferred, the honey in them may be used for human food, and the comb may be melted down for wax, but the frames should be burnt or disinfected as hereafter explained. The hive dummy should be placed at the back of all frames, or it may be removed altogether if room is required. After about ten days, re-saturate the floor-cloth with formalin solution, and if room permits, give another frame of foundation to the queen if it is required. Then leave the bees until twenty-one days have expired from the date of disinfecting the hive; in this period all healthy brood should have hatched out of the front brood frames. When the hatching of the brood has taken place, remove all the frames that are in front of the excluder dummy, shaking the bees off each frame when doing so; re-saturate the floor-board cloth, take away the excluder dummy, and move forward the frames that were behind the excluder, adding one or two frames of foundation in the centre, if the bees are too crowded on the frames they have; then work up the stock to get it as strong as possible, always

keeping the cloth saturated with formalin solution on the floor-board, and re-saturating it weekly. If the bees require food at any time after commencing this treatment, give medicated summer syrup (**178**), prepared by dusting 30 grains of paraform powder over one quart of syrup, and then thoroughly mixing. The bees will not take medicated syrup unless they require food, so it may be safely left on the frames. During the whole process the bees should be kept very warm, and if the hive is in bad condition, dirty, or not weatherproof, they should be transferred to a clean hive twenty-two days after the first disinfection, or as soon afterwards as possible. If the hive stands in a damp or very sheltered situation, it is advisable to move it, if possible, gradually to a drier and more exposed site (**182**). The frames withdrawn on the twenty-second day after disinfection should be burnt with the combs they contain, or the comb only may be thus treated, and the frames may be disinfected as below described. If the beekeeper objects to procure a suitable fumigator, or if a spare body-box cannot be provided, that part of the treatment above described which does not relate to fumigating, should be carried out; but as the hive will not have been thoroughly disinfected by this procedure, the bees should be transferred to a clean hive after twenty-one days have elapsed from the commencement of the treatment, only those frames which were behind the excluder dummy being transferred to the new hive. If the old hive and hive parts are not worth keeping, they should be burnt; in any case the quilts should be burnt. If the hive and hive fittings are worth preserving, they should all be disinfected as soon as the bees have been transferred into a new hive, whether the hive has been fumigated with formalin or not. This disinfection of the hive and hive fittings should be done by singeing all unpainted woodwork with a painter's blow lamp; or, if this is not practicable, all the unpainted portions of the hive and fittings should be thoroughly saturated with petroleum oil and then set on fire, taking care to turn each part so that every portion will be thoroughly scorched. All wax should be thoroughly removed from the grooves in the frames before scorching them. When the wood has been sufficiently scorched, the flames may be put out with a damp cloth, and the painted parts should afterwards receive two coats of lead paint. The object in view in prescribing the methods of treatment above recommended for "very mild" and "mild" attacks of foul brood, is to save the brood, while thoroughly disinfecting the hive and its contents.

171. Bad Attacks.

If more than half the brood appears to be diseased, and the stock is weak, it would be best to smother the bees with sulphur and then to burn the combs, bees, and quilts, and to thoroughly scorch, disinfect and paint the hive and such of the fittings as are worth keeping, burning any which are not worth keeping. If a smoker is available, a good method of smothering the bees

is to charge the smoker with brown paper which has been dipped in and coated with melted sulphur, and then to light the smoker and blow the fumes into the hive for five minutes. The fumes will kill the bees. If a smoker is not available, the following course may be adopted :—Dig a hole in the ground about twelve inches square and nine inches deep. Slit one end of three small sticks, each about six inches long; dip in melted sulphur three pieces of brown paper each about the size of a small envelope, and fix them in the slits in the sticks, which should then be stuck into the bottom of the hole; take off the hive roof, and place a heavy damp piece of sacking over the existing quilts, so as to confine all the fumes of sulphur in the body-box; light the papers, then place the body-box over the hole, pressing it firmly into the soil so as to prevent the escape of sulphur fumes; leave it thus for five to ten minutes, after which immediately bury the bees lying in the hole, and burn the combs with the bees thereon and any bees lying about, before they recover from the sulphur treatment. This treatment should be carried out at night when all bees have returned to the hive. If any bees remain on the floor-board, they should be killed and then thrown into the sulphur pit. If, however, the stock is sufficiently strong to make the saving of the bees advisable, provide a box without a lid, for use as a substitute for a swarm-box (**56**), bearing in mind that this box must be afterwards destroyed. Remove the hive from its stand and place the box open side downwards on a piece of thin sacking spread out on the old stand, tilt the front of the box by resting it on a small stone and place a board in front to serve as a temporary hiving-board take the frames one by one from the hive and shake and brush the bees off them on to the hiving board, placing each frame when thus dealt with on a sheet of paper in order to avoid contaminating the ground, then brush on to the hiving-board any bees still adhering to the old hive. While the bees are passing into the box from the hiving-board, remove the combs from the frames and burn them with the quilts; also remove the old hive and hive fittings, in order that all may be scorched disinfected, and painted, as already described. Any parts which are not worth thus treating should be burnt. Now, keeping the canvas over the bottom of the box, gently turn the box over, tie the canvas over the box mouth so as to prevent the escape of bees, and then put the box on its side in any place where the bees will have plenty of ventilation and will be sufficiently protected from inclement weather: then make a feeding hole about half an inch to an inch in diameter in the upper side of the box, and on it place a jar of medicated syrup, covering the jar with coarse muslin and inverting it over the feeding-hole. Leave the bees thus for forty-eight hours, after which place them in a new or clean and thoroughly disinfected hive, giving them one frame of foundation for each pound of bees; continue feeding with medicated syrup (**178** (**179**), until the comb is drawn out. Saturate the floor-board with about half a gill of a solution of one part of formalin to seven parts of water, and resaturate the floor-board with this

solution once a fortnight during the season; otherwise treat in the usual manner. After treating a stock in any of the ways above described, the ground immediately in front of the hive should be dug over and the surface turned down, or it should be disinfected by saturation with a mixture of one part of carbolic acid to ten parts of water, or some other equally good disinfectant. When manipulating bees affected by foul brood, the operator should wear overalls, which should afterwards be disinfected, and he should be most careful to wash his hands in a disinfectant solution when the work is finished.

172. Method of Treatment Recommended for the Prevention of Foul Brood.

To prevent foul brood, place the hive on a dry stand made of concrete, cinders, or flags. Avoid damp or closely sheltered sites; select preferably, elevated breezy situations. Make sure that the hive is always weather tight, and that the floor-board and roof are provided with ventilators. Keep the hive clean; in spring transfer each stock into a clean hive, and thoroughly clean and disinfect the old hive. Reject combs that have been used for two seasons. Unite weak stocks (**133**); so far as possible keep only prolific queens (**144**); reject queens over two years old; introduce young queens from a different stock now and then. Place two half balls of naphthaline on each side of floor-board between the back frame and dummy, and renew the same about every three months. Any bee-keeper who suspects, but is not sure of the existence of foul brood in his hive, may transmit to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion-street, Dublin, a sample of apparently diseased comb for examination and report. The sample should contain at least nine square inches of comb surface; it should include any cells suspected of containing diseased brood, and be carefully packed. A good method of packing is to cut out a piece of comb that will fit nicely in a one-pound section, with a separator on either side; fix the comb by passing a wire through its centre parallel to the mid-rib, and enclose the whole in another box strong enough to protect the contents from being crushed. A letter giving the sender's name and full postal address should accompany the sample.

XXIV.—RECIPES.

173. Sugar.

When the term "sugar" is used in the following recipes, it is to be understood as signifying pure refined cane 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 pure refined cane sugar only: this will be ensured by using Tate's No. 1 lump, Tate's crystals, or Fairie's crystals.

174. Soft Candy.

To make Soft Candy, use an enamelled iron saucepan or pan, into which put one pint of water and about 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 mi ture continue to boil until the proper consistency is o tained, to ascertain which, drop a little of the mixture from spoon on a plate; if the substance withdrawn can be knead into a pill without sticking to the fingers, the condition is righ if it is sticky, continue the boiling as long as necessar When the proper condition has been attained, remove the p from the fire and place it in cold water to cool; while coolin stir or whip the mixture against the sides of the pot until assumes the consistency of a white paste; then turn it out paper laid in suitable moulds, such as a plate. In half hour it will be cool enough to place in the hive.

175. Flour Candy.

To make flour candy, proceed as in recipe **174**, but after takir the pot off the fire and before cooling tl mixture, stir in one pound of pea flour, if it cannot be obtained, wheat flour m be substituted; the flour should be slowly added from a sift while the mixture is very hot, the whole being vigorous stirred at the same time.

176. Medicated Candy

To make medicated candy, proceed as directed in recipes **17** and **175**, but when the mixture is take off the fire, add one teaspoonful of naphth beta solution for every two pounds of sug used, stirring it well through the mixture.

177. Naphthal Beta Solution.

To make naphthal beta solution, procure an eight-ounce gla bottle, marked in fluid ounces. Put o ounce of naphthal beta powder costi about one shilling, into the bottle, whi should then be half filled with methylat spirit, then shake well until the powder is thoroughly dissolve after which add more methylated spirit until the liquid reach the seven-ounce mark. It is then ready for use.

178. Spring and Summer Syrup.

Water, ...	1 quart,
Sugar, ...	3 pounds,
Vinegar, . . .	1 tablespoonfu
Salt, ...	1 teaspoonful.

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

179. Autumn Syrup.

Water, ...	1 quart,
Sugar, ...	5 pounds,
Vinegar, . . .	1 tablespoonfu
Salt, ...	1 teaspoonful.

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

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. Carbolic Solution.

Water, ... 1 pint,
Calvert's No. 5 carbolic acid, . 1 ounce.

Mix in a bottle. Shake thoroughly before use. It is best to mix a teaspoonful of glycerine with the carbolic acid, before adding the water; the mixture thus prepared remains better in solution.

APOTHECARIES WEIGHT.

181. Weights and Measures.

20 grains = 1 scruple.
3 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.

182. Moving Hives in an Apiary.

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 hive 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 boards 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.

FIG. 52.—HIVE CONTAINING COMBS AND BEES, SECURED FOR FORWARDING BY RAIL.

LL, lathes fixed to body-box by screws, and thus confining frames in position.
C, canvas cover spread over frames.

183. Moving Bar-frame Hives a considerable distance.

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 (**182**) the move may be made in one operation, provided that it takes place in the winter or early spring; 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**).

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

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:—Subdue the bees (**63**); 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 there is not a ventilator in the floor-board (**20**), fit one; 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 the bees separately in a swarm-box (**56**); press the dummy and frames to the front, then wedge the dummy in position so that it cannot shift backwards, place the honey frames behind the dummy, and wedge them in position; spread a cover of open canvas about 20 inches by 20 inches over all, so that it shall project over the body-box all round; lay a lath exactly the length of the body-box on the canvas over the shoulders of the frames on each side, and tack or screw the laths down to the front and back sides of the body-box; place the lift over the body-box, inverted as for

winter, it will thus securely bind the canvas cover; screw nail the floor-board to the body-box with one screw or nail each side, tie the body-box firmly to the floor-board with rop so securing it that if the alighting board breaks in transit, t ropes round the body-box will not slacken (Fig. 52); the roof a any spare fittings should be packed as a separate parcel; aft the bees have returned and settled down in the evening, secure close the entrance; this may be done by tacking perforat zinc over the entrance, or by closing the doors tightly, a tacking them to prevent them from opening, or by some oth effective means suited to the special construction of the hiv The hive, if to be sent by train, should be labelled "LIV BEES, WITH CARE, THIS SIDE UP."

XXVI.—ARTIFICIAL SWARMING.

185. Artificial Swarming.

Under certain conditions artificial swarming may be practis with advantage by experienced b keepers. If it is desired to increase t stocks in the apiary or to provide swar for sale, the bee-keeper may select the m suitable stocks for the purpose, and, subject to their being fit condition for artificial swarming, may select the most c venient time for that operation. If a stock shows that it is fit condition for swarming and is going to swarm (**92**), b is prevented from doing so by unfavourable weather, an a ficial swarm may advantageously be made, as the bees w then settle down steadily to work, and valuable time will gained. When it is desirable to permit swarming, or wh swarming appears inevitable, and the bee-keeper must abs himself from the apiary when the swarm may be expected issue, loss may be prevented by making an artificial swar Artificial swarming should only be attempted by bee-keep who from previous experience are thoroughly conversant w the conditions which indicate that a stock is in fit condit for taking an artificial swarm from it; much harm may be d by making artificial swarms when the conditions are not s able for doing so; it should never be practised when the ex ence of foul brood in an apiary is suspected.

186. Conditions for Artificial Swarming.

The stock from which the swarm is to be taken should crowded with bees, and should cont drones; if the swarm is to be sold, it n be taken off under any conditions weather which permit of the hive be opened without injury to the stock; bu the swarm is to be made in order to increase the stocks in apiary, it should only be taken when bees are flying, and w honey is coming in freely, though an artificial swarm may taken with safety in weather which is not fine enough to ind bees to swarm naturally.

187. Making an Artificial Swarm for Sale, from one Stock.

Artificial swarming may be performed at any time of day subject to the conditions above stated (**186**). To do so, remove the stock hive to a position immediately adjacent to, but on one side of its stand; if the stand is of concrete, place on it the swarm-box (**56**) in which the bees are to be placed for despatch, the box being inverted, and placed 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 (**75**), 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.

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

To make an artificial swarm from one stock, for the purpose of increasing the number of stocks in the apiary; during the forenoon remove the stock hive as above described (**187**) to a position at one side of its stand, then place on the stand a hive containing three or four frames of foundation, 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 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. The hive containing the swarm should be examined when the bees have ceased flying on the second day after making the swarm; if it is then found that the bees do not cover all the

frames, remove as many frames of foundation as are not quired, leaving just enough frames for the bees to cover both sides. It would be a great advantage to the parent st if after the removal of a swarm with queen by either of methods described, a laying queen could be introduced to (**152**).

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

If it is desired to make a swarm for increase from two stoc let it be assumed that the swarm is to made up from hives A and B; remove A a fresh position immediately alongside stand, and on the stand from which A removed, place another hive C contain six or seven frames of foundation; transfer one frame of ho and all bees from A to C, returning the frames to A after the b have been shaken or brushed off them; move B to a fresh p tion, if possible not less than ten feet, and preferably a g deal further from the old stands of A and B; then place A the stand formerly occupied by B. C will receive the en population of A. A will receive the flying bees of B, and B lo its flying bees. This is a good method to adopt when i desired to check a propensity to swarming. A mated qu may with advantage be given to A, (**152**).

XXVII.—SPRING CLEANING.

190. Spring Cleaning.

Advantage should be taken of a suitable opportunity during forenoon of a fine mild day in spring, fore supers are put on, to transfer e stock from the hive in which it has b wintered, to a clean hive. Care should taken not to expose the brood more than is necessary. Hav prepared a clean hive to take the frames from the old one (**7** remove the old hive to a position next its stand, place the cl hive on the stand, subdue the bees (**63**), scrape all propolis the top bars of the frames, smear the frame shoulders (**7** and then transfer them to the clean hive, placing them i in the same order in which they hung in the old hive: a which cover up. The old hive should then be thoroug cleaned, washed out with the carbolic (**180**), or other di fectant solution, and it should then, if necessary, be pain and left ready for use. If a spare hive is not available, frames may be hung in a suitable box, taking care to pro an exit hole and to cover them warmly; in this they may left while the old hive is being scraped and cleaned, a which they should be returned to their hive. This operat need not be carried out in the case of stocks which it is tended to work for extracting, if the instructions already gi (**120**) are followed.

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