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HOW TO GROW QUEENS



By
WALTER T. KELLEY
PADUCAH, KENTUCKY

SECOND EDITION

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Preface

Walter T. Kelley



THIS is the second edition of my queen book. The first edition I used the title HOW TO GROW QUEENS FOR 15c EACH. This led to confusion as many customers could not get through their head that this 15c was the production cost of queens when using this system, and not the selling price of the book. However, the cost of everything has varied so widely in the last few years and as there is liable to be a wide variation in the future, I am going to be content to just call this book, HOW TO GROW QUEENS.

In the last 25 years, men under my direction have grown many hundred thousand queens and I find little that I can change or improve about this book. We follow this system, as it produces the best results for

us with the least effort and expense. Practice tends to make perfect, and you will find that the longer you use this system, the easier and better it will work.

Northern beekeepers tell me that even by using my system they cannot profitably afford to grow their own queens because this takes time, bees and equipment that they can more profitably use in the production of honey.

Probably most of the queens will always be produced in the south because there queen rearing operations start in early March and continue through October. The early queens are used largely with package bee shipments and by late May there is a surplus of queens that can be sold cheaper than the northern breeders can afford to produce them.

Now with air mail rapidly extending its services throughout the country and the world, quick, safe delivery is the rule rather than the exception. A few years ago we could not safely ship queens to California by rail, but now we fly them there over night and they also arrive in good order in Europe, Africa and South America.

Sincerely yours,

Walter T. Kelley

WHEN TO GROW QUEENS

The easiest time to grow queens is in the spring when the bees have the swarming impulse; in fact, at this season of the year, it is often impossible to keep many of the colonies from starting queen cells. However, don't try to grow queens too early in the spring, or you will run into lots of trouble and have heavy losses. Keep in mind that a chilled queen is of no value, and never let your cells or caged queens get even slightly chilled. It is much better to throw away a batch of cells than to grow out a bunch of poor queens.

From my personal experience, I would say that about the time blackberries bloom is about as early in the spring as you can satisfactorily start grafting and that you can continue throughout the season, or about until the first frost, provided that you have sufficient fresh pollen and feed when necessary.

FUNDAMENTALS OF MY SYSTEM

(1) Bees above a queen excluder, with the queen below, consider themselves queenless. To prove this, take any strong colony and move eggs and brood above the excluder, and they will proceed (during a honey flow) to build one or more queen cells and allow them to hatch out.

(2) The nurse bees that feed the young worker larva are the bees needed to start and finish queen cells. The bees drawing out comb and storing honey are not the bees for this job.

The simplest way, with the least disturbance to the colony, to get the nurse bees in a queenless state and to segregate them from the field workers and wax builders, is to move the eggs and unsealed brood above the excluder far enough in advance so that these nurse bees will segregate themselves.

(3) Feeding one quart of sugar syrup daily will produce the same results as a honey flow if there is sufficient pollen coming in.

(4) Nurse bees confined in a swarm box start more cells with less effort than any other system.

(5) Nurse bees above a queen excluder, properly fed, continuously finish about 20 cells per hive every three days throughout the season.

(6) Baby nuclei produce better queens with a far greater percentage of success and at less cost than larger nuclei or hives.

SELECTING A BREEDING QUEEN



When I started growing queens, I bought a few tested queens from reputable breeders, but they never amounted to much, and I would not advise anybody buying tested queens, as it is in my opinion that a tested queen should not be shipped in a mailing cage after her extended period of heavy laying; while queens shipped on combs are costly, and in many states combs are not permitted to enter, due to disease regulations. They are too costly compared to untested queens.

My plan is to buy as many untested queens as practicable from any reliable shipper whose bees you like. Introduce these queens in your hives and in about a year's time you will have a small percentage of extra select, tested queens suitable for breeding purposes.

In case you need a queen right away and do not have among your own bees an extra good queen that pleases you, attempt to find some nearby large bee-keeper and buy an entire colony from him, selecting the hive you desire from his entire lot. For such a hive you will have to pay fancy money, but if you are in a hurry, you must expect to have to pay a premium. Be sure that this hive has not swarmed within two months and do not let it swarm, or you will have a quick loss on your hands. The points to be considered in selecting a breeding queen are:

PRODUCTIVITY.
TEMPERAMENT.
COLOR.

Productivity

As a general rule, if your queen is extra prolific, the colony will be an extra heavy producer, as it takes a very strong colony to make big crops of honey.

Temperament

Nobody wants mean bees, and it is not necessary to have them if you breed from gentle colonies. Be sure that the bees are quiet and stay on the combs when you remove the frames.

Color

The color of the bees is one of the most apparent, and yet it should be the least deciding feature. Color is very important at a show, but in the bee hive it is honey production that counts. Most queen breeders and honey producers seem to prefer what is known as the Three-Banded Italian. In any case, it is advisable to select queens which produce uniformly-colored bees and preferably a large bee.

It is important that the drones in your breeding hive be uniformly marked. The drone is produced from an unfertilized egg. Therefore, the drone's father is actually the grandfather of the worker bees in the hive. Do not breed from a three-banded Italian colony that has some black drones; be sure that they are all uniformly banded yellow.

A good breeding queen should lay uniformly solid combs of brood without missing any cells, and should keep up this maximum production over an extended period in the spring.

SELECTING A LOCATION FOR A GRAFTING YARD

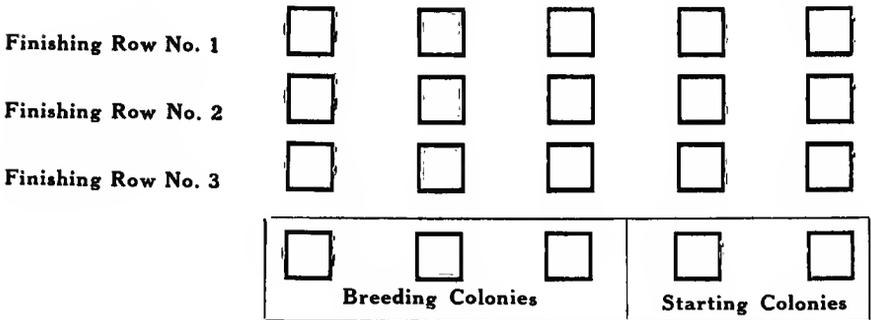
To the beekeeper, keeping all of his bees at or near home, all in one yard, there will be no question about selecting a location, as he will wish to do this work at or as near home as possible. In fact, for all queen breeders, it would seem that the nearer home, the better for queen rearing, as this job requires close attention, feeding being required every day that there is not a good honey flow on.

THE NUMBER OF COLONIES REQUIRED FOR THE GRAFTING YARD

Of course, the number of queen cells desired daily is the deciding factor in the number of colonies needed, so you will have to figure out just what your own special needs require.

One starting colony should start 100 cells daily, and each finishing colony should finish 20 cells every three days. It will take 15 finishing colonies to care for the cells produced by one starting colony, and this equipment run to capacity should require around 1,400 nuclei producing 75 laying queens daily, on an average.

THE LAY-OUT OF THE GRAFTING YARD



The grafting yard should be laid out in four rows as indicated, the number of colonies in each row varying with the capacity desired. The lay-out pictured being ample to produce and take care of 100 queen cells a day.

It is advisable to have several breeding queens if grafting is to be done every day, so that select frames of young larva of just the right age are available every day as needed.

One strong starting colony should start 100 cells a day, but it may grow weak and need to be replaced after a month or two, or it can be helped out with frames of hatching brood from time to time.

GRAFTING ROOM AND EXTRACTING HOUSE

Some sort of a grafting room is necessary in the cool spring and fall months. It should be heated comfortably, so as not to chill the young brood, and should be well-lighted, so that the operator can see the small larva.

This room can well be a part of a small extracting house, as the colonies used in this work must be extracted every week during a honey flow.

SWARM BOXES

One swarm box will be needed for every 100 cells to be started daily.

WOOD CELL CUPS AND WAX CELLS



Wax Cells and Wooden Cups

It is well to have more of these two items on hand than you figure you can ever use, as the wooden cups can be used but about once a month, while new wax cells must be used at every grafting, and it is cheaper to have these items on hand than to run short, as they will keep indefinitely.

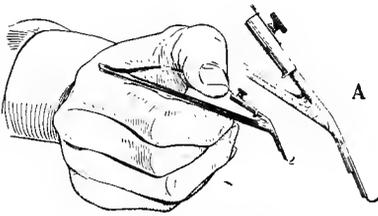
I find the factory-made compressed wax cells to be far superior to the home-made hand-dipped cells, for two reasons. The factories making compressed wax cells have special means of selecting, cleaning, bleaching and purifying the wax and only the very finest white wax is used in the manufacture of these cells. Secondly, the factory-compressed cells have a sharper edge than the hand-dipped cells, and are easier for the bees to draw out. In actual practice, I always get twice the acceptance with compressed cells that I secure from hand-dipped cells.

CELL FRAMES

I use a special cell frame, having the same dimensions as the regular Hoffman frame, but the top bar is only $\frac{3}{8}$ -inch thick while the end bars are $\frac{25}{32}$ -inch thick, they being grooved to take the cell bars. I formerly used regular Hoffman frames with metal and wood attachments for holding the cell bars, but none of these devices were satisfactory.

Two cell frames are required for each swarm or starting box, and one for each finishing colony. Each cell frame holds three cell bars and each cell bar holds 20 queen cells. However, each finishing colony can finish only one bar of cells every three days, so you can only figure on adding one bar of 20 cells at a time to each finishing frame.

GRAFTING NEEDLES



Grafting Needle

There are two general kinds of grafting needles, the automatic needle and the plain needle. The plain needles are made from about No. 14 wire with one end hooked and flattened and rounded in such a way that the hooked end can be shoved under the larva so that the larva can be lifted out of the cell without harm, and deposited in the prepared cell.

The automatic needle is a decided improvement over the plain needle, in as much that it requires less experience to operate, it works faster, is less liable to injure the larva, and in that it will give all-around better results.

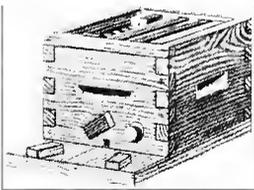
The automatic grafting needle is a patented device consisting of a small frame, slide and two springs. When the top spring is pressed downward the tongue is forced out of the slide in such a manner that it slips under the larva which can then be raised out of the cell and placed in the prepared queen cell. This tool automatically dislodges the larva in its original position when the pressure is released on the spring under the thumb.

NUCLEI OR QUEEN MATING HIVES

The queen mating hives should be made accurately of the best material with a small entrance on the bottom board that can be closed at will. The body should be fitted with two ventilation holes about 1 inch in diameter, screened to prevent the bees from using them for entrances and provided with a means of closing if and when desired. The cover should be of the telescoping type that will be absolutely bee-tight, and it should be covered with metal to keep out the rain.

Each mating hive should be fitted with three self-spacing frames and a division board feeder. I use and recommend only the type of feeder bored out of a solid block of wood, as it cannot leak and will stand hard usage.

One of the most important things to remember in queen rearing is that robbing is one of the most serious problems you have to guard against. Do not let it get started. Use only first-class equipment, do not keep your hives open any longer than necessary, and do not let any honey or old combs lay exposed where the bees can get to them, or even smell them.



Swarm or Starting Box

I use and recommend only the baby nuclei after having extensively tried out nuclei containing two, three and four regular Hoffman frames and others containing three shallow extracting frames and feeders. These large nuclei are too cumbersome to handle; they are too costly to stock; the wax worms are harder to control in them; but the main complaint I had with them was that I did not secure anywhere near the percentage of queens out of them as I do out of the baby nuclei.

On an average, each baby nuclei can be stocked twice a month with a ripe queen cell, and should be figured to be 75 per cent successful. That is, if you are operating 100 nuclei, you should reasonably expect to get 150 laying queens a month.

THREE DAYS BEFORE STARTING TO GRAFT

Feeding:

It is necessary to feed sugar syrup or diluted honey to all colonies three days before using them in queen production if a honey flow is not on, and to feed them daily thereafter when honey is not coming in from the fields.

Feed:

It is not advisable to feed honey unless you are absolutely sure it is free of disease. When honey is fed it should be diluted with water to make it the consistency of thin syrup. Do not dilute more than two or three days' supply of honey or it will sour.

Granulated sugar makes the best feed for bees, as it is odorless, does not easily sour, and there is no danger of spreading disease through its use. Equal parts, by weight, of sugar and water makes an excellent stimulating feed for queen production. Cold water is O. K. for dissolving the sugar, a two-frame honey extractor being excellent for mixing when a good quantity is to be used.

Time to Feed:

One quart daily is plenty of feed for strong colonies in queen production when no honey is coming in from the fields.



Boardman Feeder

Kind of Feeders:

Any of the feeders sold by bee supply houses are O. K. However, I use exclusively the Boardman entrance feeder, and like it best because it will not drown any bees; it can be filled without opening the hive; the operator can see at a glance if the syrup is being taken out, and because it is the cheapest and best feeder on the market for stimulative feeding.

Amount of Feed:

The bees should be fed at the same time each day, early morning being the best time, as the tendency to rob is less then and it puts the bees in shape for grafting after dinner.

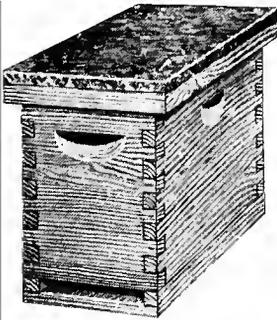
THE DAY BEFORE GRAFTING

The day before the first grafting and once a week, on Thursday, thereafter, all finishing and starting colonies should be manipulated. If the hives are half-filled with honey, they should be extracted no matter if the honey is sealed or not, as it will be fed back to the bees promptly.

Next move all of the frames with eggs and unsealed brood into the second story, placing all of the empty combs and sealed brood in the bottom body. Be sure that the queen is in the bottom story and place an excluder over the first story before returning the second story body to place, so as to keep the queen downstairs.

This operation draws most of the young nurse bees upstairs, where you will need them for this special work.

First Thing After Dinner on the First Grafting Day



Swarm or Starting Box

After being sure that you have everything at hand and conveniently located, proceed to stock the swarm box.

The swarm box has room for four frames. On one side, place a frame of unsealed honey and on the other side place a frame of fresh pollen, being sure that there is no brood on either frame. It is advisable to use a fresh frame of honey and pollen every day, as the pollen dries out and the unsealed honey is liable to sour.

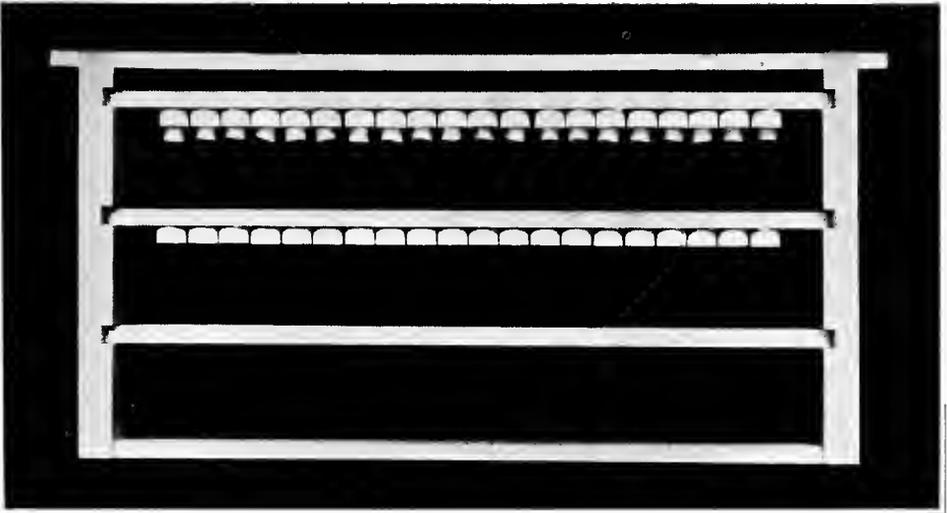
In the open space between these two frames, shake all of the bees that can hold on four frames in a crowded hive and put on the cover. In cool weather, you can hardly get too many bees in the swarm box, while in hot weather, if too many bees are used, they will become over-heated and die. Experience will show you the proper amount to use.

PREPARING THE CELL BARS

The next move is to proceed to the grafting room and prepare the cell bars. The wooden cell cups should be stuck to the cell bars. The usual way is to dip the back of the wooden cup into melted wax and then press it firmly to the cell bar. Each bar will hold 20 or more of these wooden cell cups.

The wax cells are inserted in the wooden cups by taking a new lead pencil and inserting the rubber end into a wax cell and pressing it into the hollow center of the wooden cup. This will hold the cell until the bees have a chance to fasten it more securely with wax.

Now you are ready to do your grafting. In the past, it was common practice to prime the cells with royal jelly before grafting, but I find that this is not necessary, because if the breeding colony has been fed, the larva will be floating in royal jelly, which will be scooped up with the larva.



A cell frame, showing the bottom cell bar empty—the middle cell bar with wooden cups attached—the top cell bar with the wax cells in place ready for grafting.

SELECTING THE FRAME FOR GRAFTING

The breeding colony, as well as the other colonies, should have been fed for three days previous if there is no honey flow on, so that the larva will be floating in royal jelly. Select a frame with larva about 24 hours old, which is about as small as a person with good eyesight can easily see, and take it to the grafting room and keep it warm until it is returned to the hive.

GRAFTING

Then with a grafting needle, proceed to scoop up the larva with a goodly portion of royal jelly and transplant it in the cell cup. It will take a little experience to do a good, fast job of grafting, but proceed slowly at the start and do a good job. Resting the little finger and edge of the hand on the comb will steady the hand so that you can hold the needle steady. As soon as you have finished grafting, return the comb of brood to the breeding colony and take the full cell frames to the swarm boxes. Do not use any smoke, but remove the cover gently, shaking the bees that hang on to the cover back into the space between the frames, insert the two cell frames in place and replace the cover by sliding it on so as to kill as few bees as possible. That finishes the work for the day.

Next Day at 1:00 P. M.

Go to the swarm boxes and remove the cell frames, using just a little smoke as you lift the cover, and then smoking and brushing the bees off the cell frames completely. Place the cell frames in the warm grafting room and then empty the swarm box and restock it if you plan to do some more grafting on the same day.

Consolidate your gains by taking the cell bars with the most cells started and remove the wood cups with those not started and put in their place wood cups with accepted cells taken from the least accepted bars, thereby giving you bars with 100 per cent accepted cells.

These completed cell bars should be placed in a warm, tight box as finished and just as soon as the job is completed should be placed in the finishing colonies.

Let us presume that you did your first grafting on Monday, May 31. On Tuesday, June 1, you should have several cell bars of accepted cells ready for the finishing colonies.

It has been my experience that one strong finishing colony, well-fed, will finish and seal one full bar of about 20 cells in three days. So now place one bar of cells in the top space of each cell frame in the first row of finishing colonies.

IMPORTANT: Each cell frame should be placed near the middle of the hive with a frame of unsealed brood on each side of it.

The Following Days

On June 2, place one accepted bar of cells in the top space of each cell frame in the second row.

On June 3, place one bar of accepted cells in the top space of each cell frame in the third row.

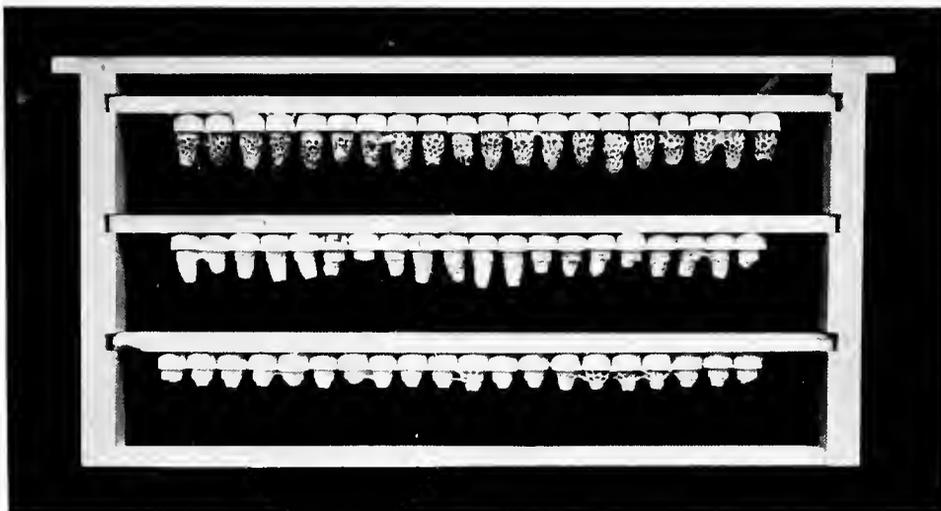
On June 4, place one bar of accepted cells in the middle space of each cell frame in the first row and so on until the ninth day when all of the spaces will have been filled.

WARNING: Do not graft on Thursdays, as cells grafted on this day must be removed and distributed on Sunday morning.

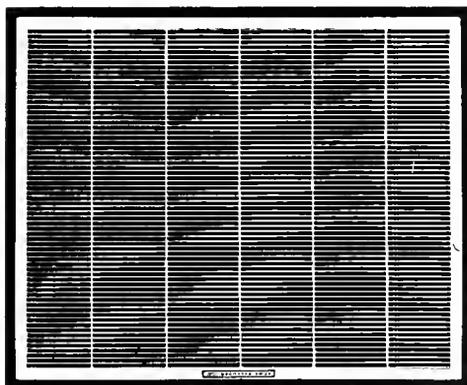
On June 10, the first thing in the morning, after feeding, remove the top cell bars from all of the cell frames in the front row and proceed to distribute them in the nuclei started the day before for this purpose.

The cycle of the finishing colonies is now completed so that the cells removed from the starting box on the afternoon of the tenth are placed in the space from which the finished cells were removed that same morning (the top space in the front row of finishing colonies).

While this rotation is simple and follows in sequence, it is advisable to take a calendar and mark down the location of each day's cells to avoid a serious mix-up. If you miss one day's grafting, just leave the space blank in the cell frames which these cells would have occupied.



A cell frame removed from a finishing colony. The bottom cell bar has just been removed from the starting box—the middle cell bar has been in the finishing colony three days—the top cell bar has been in the finishing colony nine days, and is ready to be removed. This is not the regular sequence as described, but this shows the three stages in the development of queen cells.



Wire Queen Excluder

Queen Excluders

Queen excluders get very hard usage in the grafting yard, as they must be removed at least once a week. Therefore, it is advisable to have only the strongest and the best for this use. I use and recommend the all-wire queen excluder. Personally, I find the zinc excluder very poor for this work or for honey production, as they are so easily bent and the bees don't seem to like to go through them.

Do Not Clip the Queen's Wing

In the years gone by, it was the style to clip one of the queen's wings. Many arguments were put forward in favor of this practice, most of which have long since been proven false, and at the present time, but few queens are ordered with clipped wings.

A queen uses her wings to balance and aid herself about the hive, and a clipped queen, in my opinion, is a crippled queen, as she cannot get around the hive and lay as many eggs as an unclipped queen.

STOCKING NUCLEI

On June 9, proceed to stock enough nuclei to take care of all of your cells grafted on May 31.

For best results, I prefer to stock these nuclei with one frame of sealed honey, one frame of unsealed brood, and one frame of foundation and one-half pound of young bees. However, they can be satisfactorily started without either the brood or honey, using comb foundation, but they will require more attention and there is nothing to gain, except freedom in spreading disease. If your bees have some disease, I would advise starting the nuclei on comb foundation.

To secure these small frames of brood and honey, select combs of honey and unsealed brood from your honey-producing colonies. Cut these combs to fit your nuclei frames by laying the large frames on a table, first cutting the entire comb out of the frame and then placing the small frames over the comb and cutting it to fit. The small frames of brood, if cut tight enough, can be pressed into the frame and will stay in place until the bees glue them there. Those that are slightly loose can be held in place by shoving 7d nails through the holes in the end bars and into the comb.

The frames of honey being heavier, must be tied in place with a string wrapped several times about the frames. White grocers' string is the best for this purpose, as it is cheap, and as soon as the bees have the comb glued in place, they will proceed to gnaw away the string and carry it outside.

A tight, warm room is the best place to cut these combs and stock these nuclei boxes, rather than in the open for the following reasons:

- A. The brood does not become chilled.
- B. Robbing cannot start.
- C. Rain or other bad weather cannot delay the work.
- D. All stray bees will gather at the windows and can be gathered up later. If a bunch of bees collect on the outside of any of the nuclei boxes, they will cause other nuclei to abscond from their boxes and go with them. This swarm will also collect virgin queens out flying, and general havoc will be played in a short time.

Never allow a swarm of bees to hang in a bush or to settle on the outside of a nuclei a bit longer than is absolutely necessary, as your loss will grow hourly. Always keep a shipping cage handy with a funnel so that you can get such swarms in the cage quickly, and then put this cage of bees in a basement or tight building where no stray bees can get to them or hear them.

SHAKING BEES INTO PACKAGES



Package Bees

The best way to handle bees in preparation to stocking nuclei boxes, is to shake them into a shipping cage, where any large amount of them are to be filled, and when the mating yard is removed from the source of bees. However, where just a few boxes (say 25 or less) are to be stocked and a frame of brood is to be used, the bees may be shaken directly into the nuclei.

Young bees should be used to stock the nuclei. Young bees will accept the new cell and queen, while old bees are apt to gnaw

down the cell or ball the virgin queen. Old bees die out fast, and will leave the nuclei weakened before it has time to re-populate itself.

To secure young bees to shake, they should preferably be shaken off of the brood combs. The quickest and simplest way is to locate the queen in the colony about to be shaken, placing her in the hive on the comb on which she is found and shaking as many bees as advisable into the package or nuclei.

CAUTION: In the cool spring, do not shake weak colonies and be sure to leave enough bees in those colonies to amply incubate all of the brood that they have. Failure to do this will cause you heavy loss in chilled brood.

In many northern states where the colonies build up only in time for the honey flow, it will be advisable to purchase queenless swarms from southern shippers.

The beginner should have a pair of spring platform scales to weigh his bees, as too many bees in a cage will burn up and die. In cool weather, one pound additional can be put in screened cages for short hauls at home, but in summer this cannot be safely done.

Place the shipping cage on the scales and the funnel in place over the hole in the package. Grasp the end-bar of the frame firmly with both hands, and with a series of several short, quivering shakes, dislodge the bees from the comb and they will fall into the cage. Only a few of the bees will come out the hole, while most will go to the screened sides and will soon cluster at the top of the cage.

Do not shake more bees than advisable from any one hive in order to fill a cage. Worker bees from any number of hives can be shaken into the same cage, and there will be no fighting.

STOCKING THE NUCLEI WITH BEES

Each nuclei should have enough bees to incubate all probable brood, but should not be too strong, as a very strong nuclei will prefer to start their own cells in preference to accepting those given them. One-half pound of bees is about the right amount to stock the size nuclei that I use. By weighing the bees in a package, you can make a close estimate as to the proper amount of bees to pour into each nuclei after distributing the first package.

With the frames of brood and honey or frames of foundation prepared, the bees in packages and the nuclei boxes ready, you are now ready to stock the nuclei.

See that the entrance to the nuclei boxes are closed and that one ventilation hole is open in cool weather, and that both are open in warm weather. Place the frame of honey to one side of the box and place a frame of brood next to it, tacking a 7d nail to each inside end of the box next to the end bar of the brood frame to prevent the frames from falling out of place when moving them.

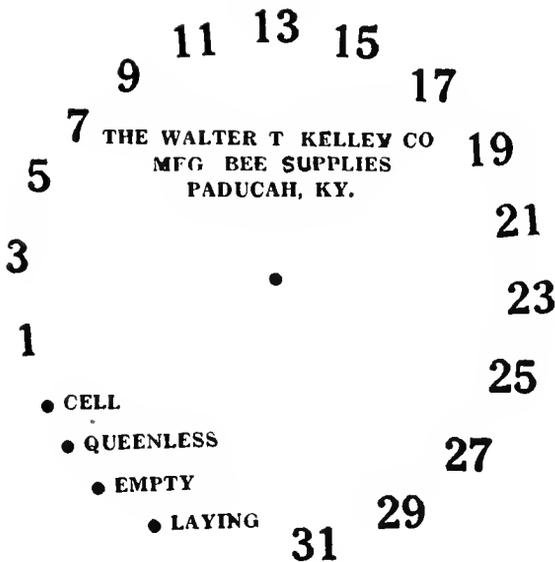
Then with a whisk broom, hand spray or other means, sprinkle the bees in the cage with water. Do not use too much nor too little. Experience is the only way to determine the amount.

If honey shook out freely on the bees when you were shaking them, they may not require sprinkling with water. If there was no honey shaking, the bees will need considerably more water than if some honey had shaken on them, etc.

As quickly as the bees are in the box, put on the cover and move them to their permanent location as soon as all of the boxes for the day are stocked.

If the nuclei are to be started without a frame of honey, it will be advisable to feed them all of the sugar syrup they will take about half an hour before shaking them into the nuclei. To do this, take a new paint brush and paint the syrup on the screen. Repeat this operation as fast as the bees take up the syrup, and continue until they stop taking it up.

INDICATOR DIAL



Even when a small number of nuclei are kept it is necessary to develop some system of record-keeping so that the operator can tell at a glance, without opening the nuclei, the condition of each individual nuclei. For this purpose, I developed a dial, fitted with two hands, that show at a glance, the exact condition of the individual nuclei.

This dial is made of paraffined card board that will give several years' service, the numbers ranging from 1 to 31, omitting the even numbers. These numbers indicate the days in the month.

The idea in omitting the even numbers is to permit the use of larger numbers and wider spacing than otherwise possible, the four possible conditions of the nuclei being designated by name.

When a cell is placed in the nuclei, one pointer is moved to **CELL** and the other pointer is moved to the day of the month. This will indicate to the operator any time that he looks at it that this box does not need any attention, except feeding, until 14 days after the date indicated.

Whenever a laying queen is removed, one pointer is moved to **QUEENLESS**. If a laying queen is left in the nuclei, the pointer is moved to **LAYING**. When the bees and combs are removed from the nuclei, the pointer is moved to **EMPTY**.

This dial and the pointers are large enough so that they can be easily read by the operator standing in an upright position. It is just the right size to be attached to the alighting board, where the pointers can be set as desired and where the pointers will not be easily shoved out of place.

THE QUEEN MATING YARD

Inasmuch as drones fly some distance, it is necessary to have only pure Italian drones in the neighborhood of your mating yard if you are to secure purely-mated queens. If your neighbor has a swarm of black bees, or if there is a black swarm in a nearby tree or building, you are up against a hard problem. It will be best to buy or requeen your neighbor's bees free, and kill out any bees in the trees or houses if you can.

However, it is advisable in any case to grow thousands of pure drones and have them right in the mating yard so that the chances are 100 to 1 that you will secure purely-mated queens.

Nearly everybody has too much drone comb, but if you are short, just put in a few empty frames between straight combs in hives, whose bees you like best, and in about three weeks you will have plenty of fine young drones. If honey is not coming in, it will be well to feed your drone colonies so that they will not kill off the drones.

The mating yard should be removed some little distance from the large colonies if possible, as during a dearth of honey, the larger colonies will attempt to rob out these small nuclei, especially after you disrupt them by removing the queen, etc. However, these nuclei have only a $\frac{3}{8}$ -inch square entrance, and under usual circumstances can protect it well. Therefore, by using the usual precautions in introducing the cells and removing the queens early in the morning or at other times when the bees are not robbing, robbing can be kept to a minimum.

Contrary to a widespread opinion, nuclei can be placed close together in large quantities with very fine success. In my mating yard I place the nuclei about a foot apart in reasonably straight rows, reversing an entrance at various intervals and placing the rows about six feet apart.

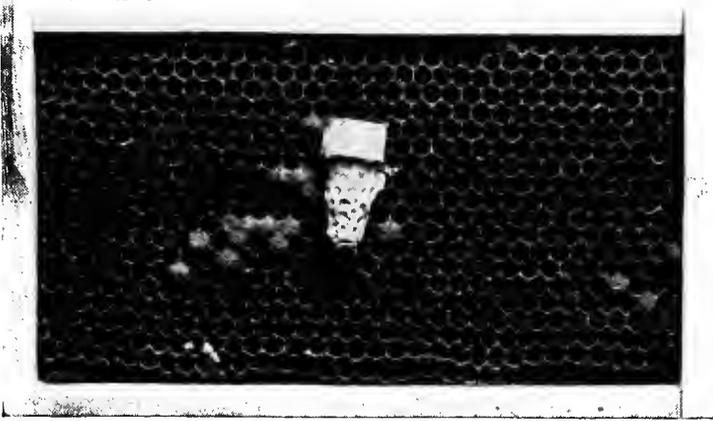
It is important that these boxes be placed on blocks or on a hillside that drains quickly, so that the bees do not get drowned during a heavy rain storm.

It is also of utmost importance that the boxes be tilted slightly forward so as to assist the bees in keeping the box clean. If the box tilts, only slightly backward, bees will allow dirt to collect and wax worms will quickly breed under this and if this debris is permitted to remain, the worms will soon have control of the box.

I do not open nuclei to look for the virgin queen, and advise you not to do so. Virgins are not too easily found, as they are about the size of the workers, often hiding or moving about from one side of the frame to the other. Now and then the bees will ball the virgin during examination or thereafter. During this process, they may kill the queen or seriously injure her, such as cutting off part of a wing, crippling a leg, etc.

If no honey is coming in, it will be advisable to fill the feeder in the nuclei box every seventh day. This should be done as quietly as possible by lifting off the cover, using one puff of smoke to drive the bees down, filling the feeder and returning the cover quietly to place.

When sheets of foundation are used in the frames, it will be advisable to keep the feeder supplied with syrup, filling it every third day until the combs are drawn out and a substantial reserve supply of syrup stored in the combs.



INSERTING THE QUEEN CELL

On June 10, the morning after the nuclei were stocked, the first lot of cells are removed from the finishing colony for distribution in the mating boxes. CAUTION. Keep the queen cells warm at all times.

With a hive tool, carefully remove the queen cells, wooden cups and all, from the cell bar; cut them apart if connected with comb, taking care not to break the outer covering of the cell, nor to let the cells fall on a hard surface. The best thing to lay these cells on is an old heavy woolen sweater and cover them with it as soon as separated.

Next proceed to the mating nuclei, and then if any bees are hanging to the cover, shake them into the box and put the cells in place, always handling the cell by taking hold of the wooden cup rather than the cell. If a frame of honey was used, shove the wooden cup into the honey far enough to securely hold the cell, but not far enough to damage the fragile queen cell. Point the cell down in its natural position, placing it about one-third down and to the center of the frame and in such a position that it will be right next to some unsealed brood on the frame of brood.

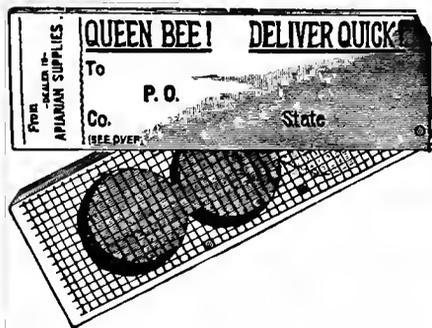
Next put the frame of foundation in place and the feeder in the remaining place, fill it with sugar syrup and put on the cover.

I do not open the entrance of the nuclei at this time, but wait until the third night and then open the entrance after dark. By this time the bees will have released their queen and will have glued the combs in place and will be well established in their home. If released quicker, there may be some drifting and loss.

In case that neither frames of honey nor brood are used, the process will be just the same except that the wooden cell cup must be stuck to the top bar of the frames. In this case, the wooden cell cups should be dipped in melted wax, which will hold them to the underside of the top bar when pressed firmly in place. Also at the same time, the feeder should be filled with syrup and never permitted to run dry until the nuclei has a substantial reserve of this syrup stored in the combs.

PREPARING THE QUEEN CAGES

Two weeks after inserting the cells in the nuclei, it is time to gather the queens.



Queen Mailing Cage

Queen cages should be bought in advance, preferably enough for the entire season, as quantity lots are cheaper than small lots and so that they will always be on hand just when you need them.

Special queen cage syrup when mixed with sufficient powdered sugar to make a soft candy, makes the best feed. This candy should be as soft as possible and yet not run. If the candy is too hard, the bees will not be able to eat it and will die. If too soft it will run and it will kill the bees.

Pack the candy in the paraffined end of the cage, taking care to fill the $\frac{3}{8}$ -inch exit hole tight (this is important). Queen cages are paraffined to prevent the wood from absorbing the moisture out of the candy and drying it out quickly. Place the paraffined paper over the candy and tack on the screen, using the $\frac{1}{4}$ -inch nails.

Use a magnetic hammer for picking up these $\frac{1}{4}$ -inch nails and driving them home. First spread out a small supply of these nails so that none of them touch and then with the magnetic end of the hammer, pick up a nail by its head and drive it home. With a little practice, you can drive these $\frac{1}{4}$ -inch nails home at the first shot and do it fast.

Nail the candy cover card (Don't Remove This Card) over the candy entrance with $\frac{1}{4}$ -inch nails and nail the perforated gate on the $\frac{3}{8}$ -inch entrance hole with $\frac{3}{8}$ -inch nails, nailing one corner only, so it will be ready to receive the queen and bees. Then stick $\frac{3}{8}$ -inch nail into the candy in the cage; this nail will be used to nail the other corner of the perforated gate after the queen bees are placed in the cage.

I find it best to fill all of the cages with candy and then wash my hands and nail on all of the screens, then the "Don't Remove Cards" and finally the perforated gates.

Some beekeepers break off the "Don't Remove Cards" to permit the queen being liberated faster, some even going as far as to poke a match through the candy to further expedite release. However, I always leave the card in place and advise this method.

If you are going to use the queens yourself the same day as caged and the weather is warm, I would advise you to cage the queen without attendants, as this will give you better acceptance. I have often noticed that the bees, even when they accept the queen, kill all of the attendant bees.

CAGING THE QUEEN

Remove the cover of the nuclei, driving the bees down with a little smoke, then remove the frames and find the queen. She will be easily found, as she will be bright and yellow and with the small amount of workers in a baby nuclei it is no problem at all to find young queens.

Holding the cage in the left hand, pick up the queen gently by the thorax, that is the center portion of the body to which the legs and wings are attached, between the thumb and fore-finger of the right hand, and place her head in the hole and she will enter without urging. Then place the fore-finger of the left hand over the hole as soon as the queen passes in, so as to hold her captive until the job is finished and the gate nailed in place. Picking up the queen in this manner is much better than picking her up by the wings.

For all small producers, the best place to secure the worker bees attendants for the cage is from the nuclei from which the queen is removed. Large producers will find it quicker and better to fill the cages in the work shop from a frame of a special queenless hive supplied regularly with hatching brood, so that there is an abundance of young bees.

There is no need to be so gentle with the worker bees, and it is safer to catch them by the wings. If properly caught by both wings, they cannot sting you. For the first trial, you had better pick out a bee that has just hatched or one that is eating honey. An experienced operator can pick up these worker bees as fast as he can reach for them and very seldom gets stung. When the bee is caught, place her head in the $\frac{3}{8}$ -inch entrance hole with a slightly rolling motion of the fore-finger, shove the bee into the cage, immediately after which replace the left fore-finger over the hole so that the captured bees cannot escape.

If during the 14 days there has been almost continuous rainfall or cold weather, the queens may have been delayed in taking their mating flight and may be delayed a few days. I have seen cases where most of the queens were not laying until the 17th day, and then most of them were fertile and O. K. Also, in favorable cases, the queens may be found laying on the 11th day. However, it is not advisable, except during a rush, to remove the queen until she has layed in practically every available cell, as by so doing the nuclei will renew itself and maintain its strength and continue in good order throughout the season.

If on the 14th day you have no use for the laying queens, it is well to inspect them anyway, filling the feeder with syrup if a good honey flow is not on and mark those that are queenless so that they may be given a cell at the first opportunity.

Queens cannot be kept indefinitely in these baby nuclei, as when they have no more space in which to lay, they get restless. The best plan is to remove them regularly on the 14th day if possible.

If the bees swarm out of the nuclei, the loss is heavy, as all of the bees leave and the brood is a complete loss. If you have no need for the queen on the 14th day and have ripe cells ready, it is cheaper to kill the queen and put in the ripe cell than to run the risk of her swarming out with the ensuing loss.



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