EXPERIMENTS CONCERNING EXTRACTION OF WAX FROM OLD COMBS

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Today, just as in the past, wax plays a very important role in the economy of apiculture. Of bee products it ranks second, after honey, considerably helping the beekeeper to increase the profitableness of his work.

Primitive people are likely to have used wax after squeezing by hand the combs taken from bees, and having extracted the honey.

There surely existed a method in antiquity, of obtaining partially purified wax. A method which was used for a long time and which is still used today by beekeepers with rudimentary practice consists of boiling the combs in a receptacle of water and collecting the wax which floated to the surface.

Nowadays, by melting old combs and cappings, any beekeeper will obtain an increased quantity of wax from his own colonies.

In order efficiently to process old combs one needs appropiate appliances.

The steam wax extractor is widely used in a number of countries but requires too long a time as compared to the quantity of wax obtained, and its relatively light structure does not allow for the necessary pressure.

The well-known solar wax extractor is used in certain areas according to the existence of sun. It is of valuable help to us beekeepers in the Mediterranean region, especially when we have to melt wax containing little impurities : cappings and combs broken during honey extraction.

I think that this simple and economical appliance is a really indispensable instrument for beekeeping in Africa which is now undergoing a promising development, but which is not endowed with the basic equipment to enable mar-

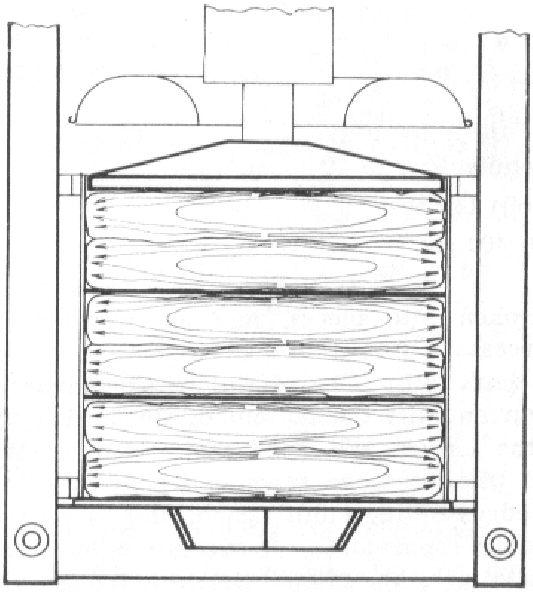
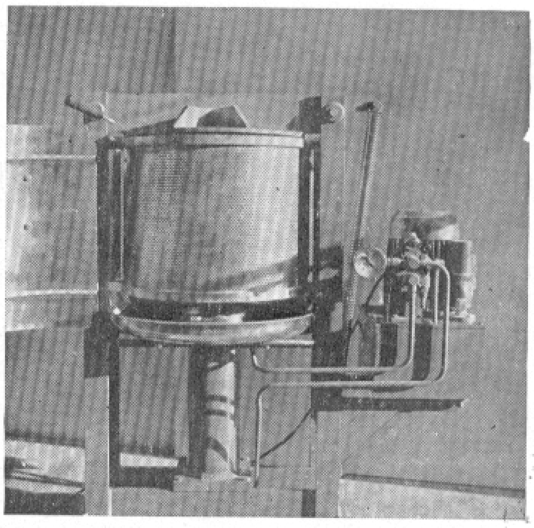


Fig. 1. Section of the inside part of the full basket, before extraction starts



Our hydraulic press

keting of its top quality beeswax. Consequently, because sun heat is free, all beekeepers who have this possibility should use the benefit of it.

I made my first experiments of extracting wax from old combs by cheap and easy to handle appliances. The combs taken out from the wood frame were introduced into six jute bags (five in each), placed in a tank with water, and left to boil on a wood fire. When, the contents of the bags were well mashed, we put them into a small press and started immediately to press out the wax using the utmost possible force, even with two men. When the quantity of wax obtained did not justify more effort, the mobile section of the press was unscrewed and the still warm bags were taken out; the wax scraps were removed from them and the rest was melted once again. At the end of the day, we were highly satisfied with the great quantity of pure wax obtained, but the procedure was somewhat tiresome.

Consequently, we perfected a hydraulic press, with greater efficiency and requiring less physical effort.

The press is made up of a vertical piston, which when driven by an oil hydrodynamic device lifts the bottom of the basket towards the cover, the wax beging extracted in this way.

By setting the electric motor into motion, an oil flow exists which can be guided to the lower end of the piston in order to push it up, or to its upper end in order to push it down.

The cover is fitted to the appliance by a clamp, and is easily handled by a spring when the basket must be emptied or filled again. The cylindrical basket is made of perforated steel sheet with 3 mm mesh. Under the basket there is a semicircular tank, wherein the pressed wax flows, and then it runs into the settling tank. To avoid the spreading of wax drops around the press, two semi-circular protection screens, are used.

Technical features

Length and width	130 × 60 cm
Height	120 cm
Diameter of basket	45 cm
Weight of press	280 kg
Pressure	up to 180 atmos. (equivalent to 20 tons)

Time of ascension of piston (without oil) 140 sec

Time of descent of piston (without oil) 100 sec

We noted that when combs are broken into pieces, less air remains in the cells and consequently less time is necessary for attaining the boiling point. We put the broken combs (40—50 kg) in a tank with 100 l of water. When boiling starts, we set the electric motor into motion and lift the bottom of the basket up to about 6 cm from the upper ridge of the basket. We lined the bottom of the basket with a stiff, flax or jute cloth and using a large spoon we pour 12—15 l of hot paste onto the cloth. We bend the edges of the cloth inside, and make the bottom of the basket descend thus providing room for 6—7 successive loads of paste; meanwhile we continue to pour paste on other cloths. Between the second and fourth cloth we put a 4 mm thick metal disc in order to divide the "mass" of wax mixture to be pressed, into three sections.

We found out that the smaller the "masses" the more wax is obtained in a shorter time. We also noted that the number of cloths in between the wax paste has a decisive importance. The cloth acts like a guiding duct along which wax flows out of the basket ; the more cloths exist, the easier and quicker is the extraction operation.

When the basket fills up, we put the cover on and make the piston ascend and thus wax extraction begins. At first, wax is mixed with a great quantity of water — from that used for melting the wax, then the quantity of water decreases gradually and at last only pure wax flows out.

After 15—20 minutes, it is not necessary to increase the pressure. We reduce the pressure, open the basket und take out the cloths which now contain only wax residue. These cloths will be cleaned afterwards, while the press will extract the second batch of wax wrapped in other cloths.

When a 150 l tank is used, we do not put all its contents into cloths, for extraction : the quantity which remains in the tank plays the role of thermal accelerator for faster melting of the next quantities of combs.

By using this press, waste of time is prevented, because the operations performed while the piston ascends (pressing and unloading) and while it descends (loading) are successive, the worker having nothing to do but the necessary operations.

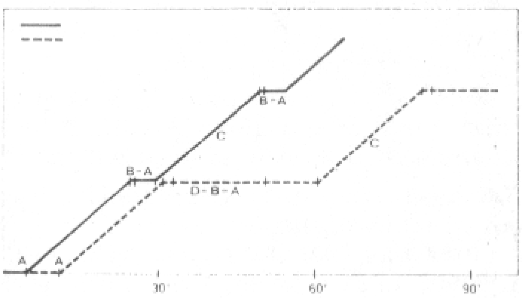
The usual press has a central screw down to the bottom, on which the upper board is fixed, and which presses the combs, and besides the fact that the bags might be torn by the threads of the screw, much time is lost for unscrewing the upper board and taking the bags out, one by one.

The diagram below illustrates the great advantage of the hydraulic press because it eliminates waste of time.

We said that the wax mixed with water flows from the press into the settling tank — which is made of wood to avoid cooling the melted wax too quickly. A partition wall exists in the tank, with 2 cm interval between it and the bottom.

According to the principle of communicating vessels water flows into the second compartment (Fig. 2) and then out of it, while the liquid wax being lighter, is floating and remains inside the tank. After two or three extracting cycles, 20—25 kg of wax exist in the settling tank, which can be poured into moulds.

This type of press gave us a pleasant surprise when we pressed a quantity of cappings we thought were free of honey. From each extracting cycle — which



The diagram illustrates the advantages of the hydraulic press. On the vertical : wax production ; on the horizontal : duration of operations in minutes — A = loading ; B — unloading ; C — extraction ; D — unscrewing ; ———— hydraulic press ; — — — press with screw

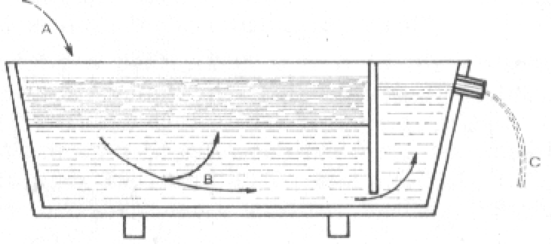


Fig. 2. Settling tank : A. Water and wax flow from the press ; B. Water is separated from wax ; C. Water flows out

lasted for about 15 min each — 8 kg of clear honey were obtained, which we could add to that already in the honey ripening tank.

The honey obtained from wax cappings melted in any other appliance would not have been marketable.

When needing more room on the tables for uncapping, we press the cappings which still contain honey, and obtain 25 kg of honey from each batch.

We found that cloths are also necessary when pressing wax cappings, because the pressed wax would block the mesh of the basket. But for wax only, 2 cloths are quite enough.

The wax lumps thus obtained have only a small quantity of honey in them and are placed up in a storehouse. When one can use the solar wax extractor, we break the combs into small pieces in order to facilitate speedy melting ; pure wax, without honey is thus obtained. When it is quite late in summer and not enough sun heat exists, the wax may be kept in the storehouse and extracted during winter.

Conclusions

Given the present, favourable wax prices and the trend to increase in the world market, every wise beekeeper will strive to obtain the greatest possible quantity of wax from his bees.

I know that the efficiency of this type of press (about 400 g of pure wax obtained from 1 kg of cold combs) is lower than that in industrial units where solvents are used, but I still consider that our method may be used by numerous semi-professional beekeepers who wish to melt the combs. Together with a considerable profit, the method also has the advantage that this income may be obtained during a period free of work in the apiary.

Also, I think that this press, which is easy to handle and requires only one worker, could be widely used in those regions of Africa where honey is even now extracted by hand squeezing of the combs.

Due to obvious difficulties, honey extraction could be performed only at a central extraction unit equipped for this purpose, and the same press could be used subsequently for extracting wax from combs.

I am happy to think that my experience gained during a long period of time could be helpful to other beekeepers, thus contributing to technological progress which is of vital importance to the development of apiculture the world over.