May 14, 1957 G. N. BLISS 2,792,253

EGG LIFTER

Filed April 27, 1953 2 Sheets-Sheet 1

Fig. 1.

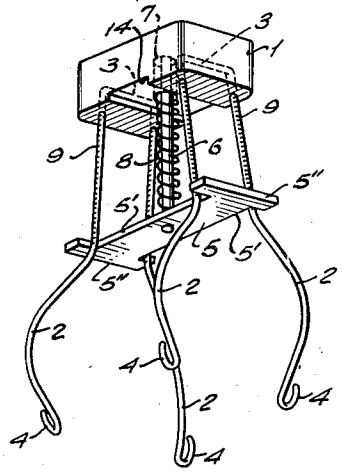


Fig. 2.

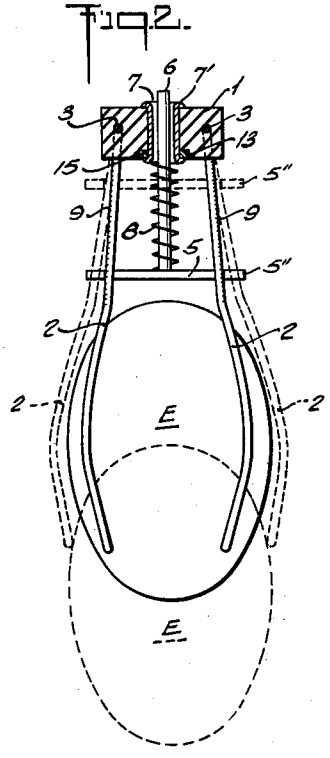
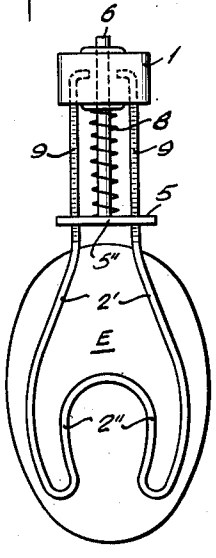


Fig. 3.



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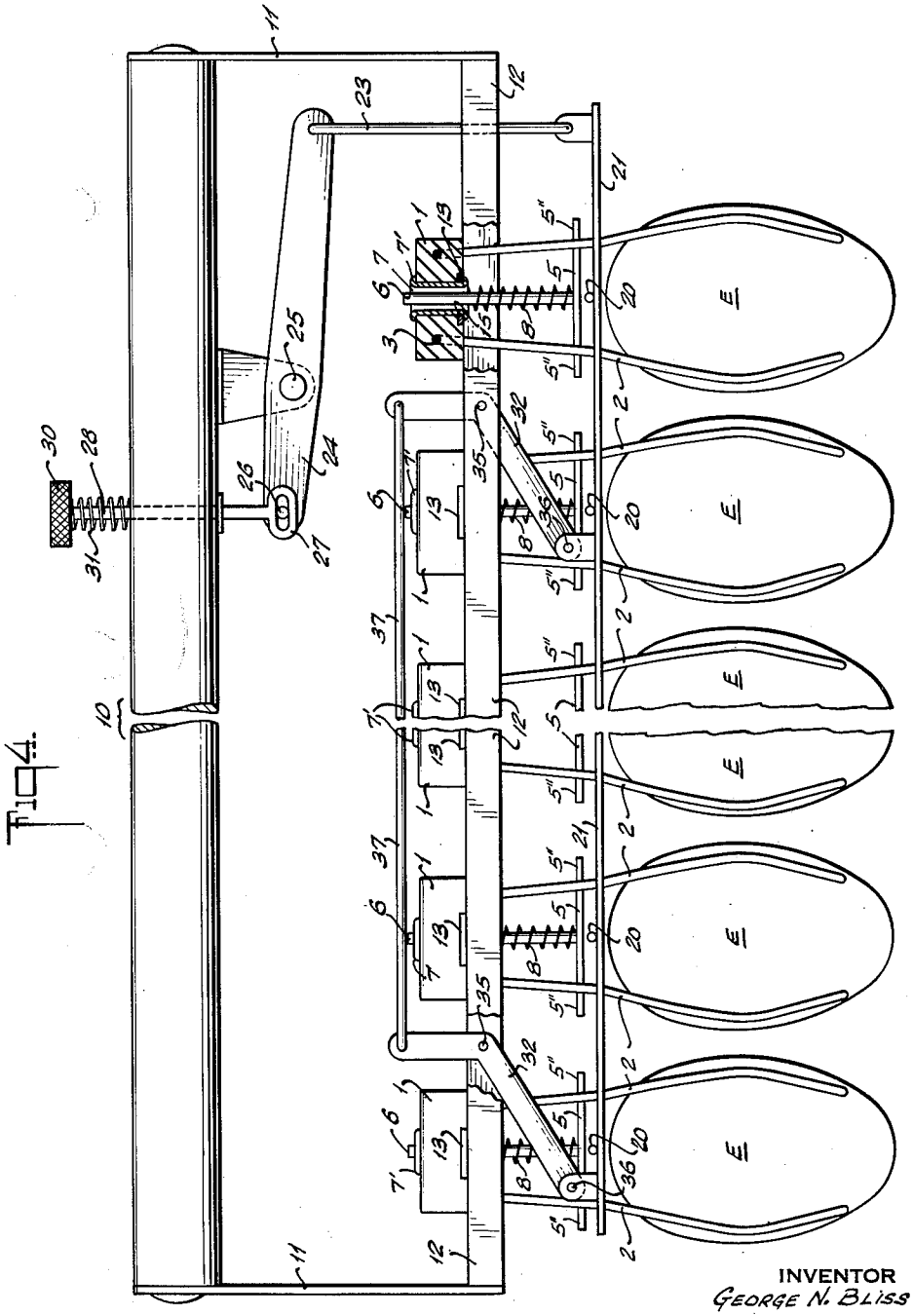


Fig. 4.

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EGG LIFTER

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6 Claims. (Cl. 294—100)

This invention relates to lifting devices for eggs, for use where large numbers of eggs must be quickly lifted from the shipping crates or flats in which they come. Numerous types of such lifters have been proposed and several are on the market; but the problem of combining delicacy of operation with speed and reliability has presented many difficulties which have not been satisfactorily solved in the past. The shells of eggs are easily cracked; eggs vary in size and tend to assume various positions in the cells of the flats; there is little room for the lifting fingers to operate; and the workman needs a device that is easy to center and operate. The types of lifters most in use require so much pressure to flex all the spring elements that the total effect on the operator's hand is rather fatiguing.

A further difficulty arises from the fact that the "flats" or trays on which the eggs are carried in a crate are made in various types. While their material is generally paper pulp formed with cup shaped depressions in which the eggs may rest, the type most used in the United States separates the eggs by criss-cross cardboard strips forming rectangular cells, such a separator being called a "filler." Alternate layers of "flats" and "fillers" build up the case in which the eggs are held,—each egg in its own square cell. Since eggs are likely to vary in size and position, they may sometimes wedge against a filler strip and be hard to lift, thus interrupting the normal operation. Another type of tray more used in Canada and the west coast does not use a separate filler and avoids rectangular cells, but molds the paper pulp in curves to hold the eggs more closely. While that may have its advantages, the form is such that it is even more difficult to insert the fingers of a multiple lifter. There is very little room in any case, and consequently there is always the danger of the lifter mechanism crushing or cracking an egg. While a single egg has little value, the time lost in cleaning up a leaky egg before the chain of operations can start again is a serious matter.

The principal purpose of the present invention is to develop a form of lifter mechanism which will have sufficient stability to guide the fingers into the proper cells and around the eggs, yet with a minimum of force and with such resilience that adjacent eggs cannot be forced against each other, whatever their position in the cells. Another object is to devise a form of lifting fingers that can be applied to both the U. S. filler flats and the Canadian molded type. Further objects are to reduce the cost and complexity of such lifting devices; make a lifter that is not likely to be damaged by the accidents of use, and that will not injure the eggs. Various other objects will become apparent as the description proceeds.

Referring now to the drawings forming part of this specification,

Fig. 1 is a perspective view of a lifting unit having two pairs of lifting fingers.

Fig. 2 is a cross-sectional view thru the middle of the unit of Fig. 1 showing the lifting fingers in broken lines in their more open position with the locking plate

lifted, and in solid lines when finally closed around an egg, with the locking plate dropped into a lower locking position.

Fig. 3 is a detail view of another form of lifting fingers, these being held in pairs by lower connections, whereas in Fig. 2 they are held in pairs at the top.

Fig. 4 is a side elevation view of the assembled lifter mechanism to lift a quantity of eggs, with a portion of one unit shown in cross-section.

Similar reference numerals refer to similar parts thruout the various views.

Referring now to Fig. 1 and Fig. 2, the lifting unit for an egg E, (of which a large number are used in a multiple lifter), comprises a resilient anchor block 1 made of rubber or similar elastic synthetic material, which is molded into a compact mass around the upper part of the lifting fingers or wires 2 by which the egg is to be grasped. Such a block of solid rubber is rather compact and only moderately elastic, so that the wires 2 are definitely held in a suitable position for engaging the egg when they are thrust down around it. But as only the upper parts of the wires 2 are embedded in the block 1 and the exposed part of the wires 2 are relatively long, a very gentle force can move them sufficiently in the elastic block 1 to permit them to guide themselves around an egg without cracking it or exerting much pressure. However, and equally important, there is no looseness or "sloppiness" in the action of the fingers 2, so that the operator can feel his way and readily guide them into the proper cell in the flat, and avoid getting a wire or prong 2 into a wrong cell.

Since it is the resiliency of the anchor block 1 that principally determines the action, the fingers or prongs 2 can be made of stiff wire or other material, as distinguished from the very flexible wire required in other types where the wire itself must be flexible in order to spring around the egg. The present construction, with a stiffer wire anchored in a resilient rubber block, not only operates better on the egg and in the paper cell, but also can stand up better against the dropping and other incidents of use.

The wire fingers 2 are made in pairs as shown in Fig. 1 with each pair operating in unison due to the connecting cross-bar 3 embedded in the rubber block 1. This unison of action may also be obtained by connecting the fingers outside the block as shown for example in Fig. 3, where each pair of fingers 2' has a cross loop 2'' so that they will move in and out together. Any other suitable cross-connection either above or below the block that insured movement together might be used.

The solid rubber is molded tightly around the upper parts of the fingers 2 or 2' and cross-bar 3 so that the fingers are quite definitely held in position to initially contact the egg and not wander into other cells; yet the slight resilience of the mounting is sufficient to give the outer tips of the fingers a delicate sensitivity to guide themselves down around the egg. The lower tips 4 of the fingers are preferably bent as shown, or can be made with rounded metal ends or dipped in some material such as plastic to give them smooth rounded tips to slide easily over the egg without scratching it.

It might be thought that the lifting fingers would work just as well if they were individually embedded in the rubber, without any cross-connections to make them work in pairs. However, I have discovered that individual fingers tend to avoid gripping the egg, by all sliding off in the same direction, while if they are in pairs the tendency is to center on the egg so that the operator can more easily work by the feel of the apparatus.

After the fingers 2 have moved down around the egg as shown in Fig. 2 so as to embrace it, they must be locked in place, for their pressure on the egg is very

light and if they were lifted the egg would fall out of their grasp. The action here is quite different from the ordinary lifters in which the spring of the wire itself is strong enough to hold the egg when lifted. The action in the present device is much more delicate, and it is therefore necessary to provide an irreversible lock which will not affect the fingers when engaging but will prevent them from releasing the egg afterwards, until the egg has been safely lifted and carried to its destination.

This irreversible locking device consists in general of an element that does not operate on the fingers during the engaging period, but can later be set to prevent their outward movement after the egg has been grasped. It is thrown into and out of action by the operator as will be described. Any rigid locking device or at least one capable of preventing backing away after engagement may be used.

A preferred form that is very light and simple to make is shown in the drawings and best seen in Fig. 1 and Fig. 2. It consists of a limiter which moves up to touch the wires so that they cannot back away, and may be a plate **5** having a generally rectangular form which is carried on the lower end of the vertical rod **6** that extends loosely up thru the hole **7** in the elastic block **1**. A light spring **8** tends to force the plate **5** downward. The plate **5** is cut away at the sides **5'** so that it will not prevent any inward motion of the fingers **2**. The plate **5** is also provided with a pair of T heads **5''** which, if in contact with the fingers, will prevent their outward movement. When the fingers **2** are being slipped down over the egg E to engage it, as shown in broken lines in Fig. 2, the plate **5** is held up closer to the anchor block **1** by means to be described. In this upper position the T heads **5''** do not touch the wires **2** even when their tips are spread out to slide around the wide part of the egg. In other words, while engaging, the fingers **2** are entirely free, except for the slight constraint of the rubber block **1**.

As the fingers slide down around the larger part of the egg they close again inwardly due to the resilience of their mounting, and would hold the egg were it not for the fact that their resilient mounting is too feeble. In order to hold the egg positively the locking plate **5** is then released and drops down to the position shown in solid lines assisted by the light spring **8** until the T heads **5''** engage the wire fingers **2** or **2'**. As the plate **5** is light and the spring **8** is also light, no considerable pressure is put on the wire fingers, but they are definitely prevented from yielding outward any further. The term "lock" or "locking" as used herein refers to means for holding an element where it is, as distinguished from operating springs or other devices tending to move elements to other positions, such as sometimes used in pullers. As the wires **2** (or **2'** Fig. 3) slant slightly outward there may be a tendency to wedge the plate **5** upward when the weight of the lifted egg comes on the lower part of the wire fingers. To guard against this the upper part of the fingers may be slightly roughened as at **9** so that friction will prevent riding up.

With the fingers thus held from releasing, the egg is safely gripped and can be lifted from the flat, and carried about. To deposit the eggs it is only necessary to release the lock plate **5** by lifting it, and the eggs will then fall from the fingers of their own weight. While positive mechanism might be provided to open the fingers as in other lifters, it is not here necessary, since the effect of the elastic anchor block is to give only a very light grip, which from the standpoint of easy operation is one of the chief advantages of the device.

Instead of the T headed plate **5**, a loose ring of fairly rigid material might be dropped around the outside of the fingers to lock them against further outward movement. Another possibility is the use of a material that can be made instantaneously rigid by electric means, such as used in fluid magnetic clutches, to hold the fingers from moving after they are engaged. But the plate locking

mechanism devised for the operation as described in Fig. 1 and Fig. 2 is a very light and satisfactory form. It is generally desirable to have the locking mechanism below the anchor block, but of course it could also be located above the block by extending the wires thru the top.

Having described an individual lifting unit as shown in Fig. 1 to Fig. 3, reference is now had to Fig. 4 which shows a complete lifter having a sufficient number of these units to lift an entire flat of eggs at a time, and interconnected for simultaneous operation. There are usually thirty or thirty-six eggs, depending on the type of flat, arranged in five or six rows of six eggs each.

As shown in Fig. 4, the handle **10** with the brackets **11** carries the rectangular frame **12** which is provided with cross-bars **13** on which are mounted rows of lifting units having their anchor blocks **1**, each anchor block **1** being molded with a shallow groove **14** in its base into which the cross-bar **13** can fit to prevent turning out of position. Holes **15** are provided in the cross-bar **13** thru which the vertical rods **6** of the locking plates **5** may loosely extend, these holes **15** being aligned with the holes **7** in the elastic anchor blocks **1**. For rapid production the hole **7** is preferably lined with a metal grommet **7'** clinched over the block **1** at the top and under the cross-bar **13** at the bottom so as to definitely hold the block **1** in place. The rod **6** can play up and down in the grommet hole, but being a rather loose fit does not prevent the locking plate **5** from easily adjusting itself to whatever position the adjacent parts of the fingers **2** may take in grasping the egg.

In the initial guiding and grasping operation the locking plates **5** must be held up out of action in order to leave the fingers **2** free to follow the contour of the eggs. In order to do this a grille-like structure of rods **20** is provided. These unlocking rods **20** extend across under each row of locking plates **5**, the ends of these rods **20** being visible as small circles in Fig. 4. In order that they may be moved up and down in unison, the rods **20** are mounted on a frame **21** which can be lifted by the link **23**, attached to the lever **24**. The lever **24** is mounted on a pivot **25** attached to the handle **10**, and the other end of the lever **24** has a stud **26** which plays in the yoke **27** of the operating plunger **28** having the push button **30**. A helical spring **31** may surround the plunger **28** to assist its return operation.

To insure that the rods **20** and the frame **21** all rise and fall together in the same degree when the button **30** is operated, a parallel motion mechanism is provided consisting of the bent levers **32** near each corner of the movable frame **21**, these bent levers being pivoted to the main frame **12** on shafts **35** and pivoted to the movable frame **21** at the points **36**. The shafts **35** extend back to the far side of the frame where similar bent levers are located, thus insuring that when one bent lever **32** moves all such levers move similarly. The upper ends of each pair of the bent levers **32** are connected by rods or links **37** so that the upper ends of the bent levers must move in unison, thus insuring that all corners of the movable frame rise or fall together at the same rate in parallel motion. It may be noted that strictly speaking only one thru shaft **35** need be provided, since in that event the motion of all four bent levers **32** would still be in unison because of the rods or levers **37**. But for smoothness of action two thru shafts **35** are preferable as shown. This permits the operating button and levers mechanism to be applied to any part of the movable frame and yet lift it evenly.

While I have in the foregoing described certain specific forms by way of example, it will be understood that they are merely for purposes of illustration to make clear the principles of the invention, which is not limited to the particular forms shown but is susceptible to various modifications and adaptations in different installations as will be apparent to those skilled in the art without de-

parting from the scope of the invention as stated in the following claims.

I claim:

1. In an egg lifter, the combination of a resilient anchor block, a set of grasping fingers having upper ends embedded in the anchor block and being connected for conjoint movement by a cross-piece capable of movement with the fingers so that said set of fingers will move in unison, a second set of grasping fingers having upper ends embedded in the anchor block and being connected for conjoint movement by another cross-piece capable of movement with said second set of fingers so that said second set of fingers will move in unison, the two sets being capable of independent movement due to the resiliency of the block in which they are embedded and having their fingers sufficiently long to grasp an egg, the fingers and resilient mounting in the anchor block being too feeble of themselves to hold the egge when lifted, a supplementary lock for holding the fingers after they have grasped the egg so that it may be lifted, said lock floating upon the two sets of independent fingers to allow their conjoint action in unison after locking so that the egg as a whole can move freely laterally without increasing pressure of the lock, and a release for the lock.

2. In an egg lifter, the combination of a resilient anchor block, a set of grasping fingers having upper ends embedded in the anchor block, a second set of grasping fingers having upper ends embedded in the anchor block, the two sets being capable of independent movement due to the resiliency of the block in which they are embedded and having fingers sufficiently long to grasp an egg, the fingers of each set being connected together for movement in unison independently of the other set, the fingers and resilient mounting in the anchor block being too feeble of themselves to hold the egg when lifted, a supplementary lock for holding the fingers after they have grasped the egg so that it may be lifted, said lock floating upon the two sets of independent fingers to allow their conjoint action in unison after locking so that the egg as a whole can move freely laterally without increasing pressure of the lock, and a release for the lock.

3. In an egg lifter, the combination of a resilient anchor block, a pair of lifting fingers connected for conjoint movement in unison and having upper portions embedded in the resilient block, a second pair of lifting fingers also connected for conjoint movement in unison and having upper portions embedded in the resilient block, said two pairs of fingers being capable of movement independently of each other due to the resiliency of the block in which they are embedded and having their fingers sufficiently long to grasp an egg, the fingers and resilient mounting in the block being too feeble of themselves to hold the egg when lifted, a supplementary lock for holding the fingers after they have grasped the egg so that it may be lifted, said lock floating upon the two sets of independent fingers to allow their conjoint action in unison after locking so that the egg as a whole can move freely laterally without increasing pressure of the lock, and a release for the lock.

4. In an egg lifter, the combination of a resilient anchor block, a set of grasping fingers having upper ends embedded in the anchor block, a second set of grasping fingers having upper ends embedded in the anchor block, the two sets being capable of independent movement due to the resiliency of the block in which they are embedded and having their fingers sufficiently long to grasp an egg, the fingers of each set being connected together

for conjoint movement in unison, the fingers and resilient mounting in the anchor block being too feeble of themselves to hold the egg when lifted, a supplementary lock for holding the fingers after they have grasped the egg so that it may be lifted, said lock comprising a movable pair of stops outside said fingers to limit their outward travel when engaged, an actuator for said stops, and a release for returning the stops and actuator to the unlocked position, said lock floating upon the two sets of independent fingers to allow their conjoint action in unison after locking so that the egg as a whole can move freely laterally without increasing pressure on the lock.

5. In an egg lifter, the combination of a resilient anchor block, a set of grasping fingers having upper ends embedded in the anchor block, a second set of grasping fingers having upper ends embedded in the anchor block, the two sets being capable of independent movement due to the resiliency of the block in which they are embedded and having their fingers sufficiently long to grasp an egg, the fingers of each set being connected together for conjoint movement in unison, the fingers and resilient mounting in the anchor block being too feeble of themselves to hold the egg when lifted, a supplementary lock for holding the fingers after they have grasped the egg so that it may be lifted, said lock comprising a movable pair of stops outside said fingers to limit their outward travel when engaged, a spring actuator for said stops, and a release for returning said spring actuator and stops to the unlocked position, said lock floating upon the two sets of independent fingers to allow their conjoint action in unison after locking so that the egg as a whole can move freely laterally without increasing pressure on the lock.

6. In an egg lifter, the combination of a group of lifter units, each unit comprising a resilient anchor block, a set of grasping fingers having upper ends embedded in the anchor block, a second set of grasping fingers having upper ends embedded in the anchor block, the two sets being capable of independent movement due to the resiliency of the block in which they are embedded and having their fingers sufficiently long to grasp an egg, the fingers of each set being connected together for conjoint movement in unison, the fingers and resilient mounting in the anchor block being too feeble of themselves to hold the egg when lifted, supplementary locks on the various lifter units of the group for holding the fingers after they have grasped the egg so that it may be lifted, each such lock engaging its particular set of fingers of a lifter unit independently of the setting of the locks on the other lifter units so that each set of fingers can adjust itself to its particular egg with the locks having different individual settings to equalize the pressure on eggs of various sizes in the same lift, releases for the locks, a frame on which said group of lifter units is mounted, a handle on said frame, interconnections between the units of the group for simultaneous releasing action, and a manual control adjacent the handle, whereby the locks on the lifter units may be released.

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