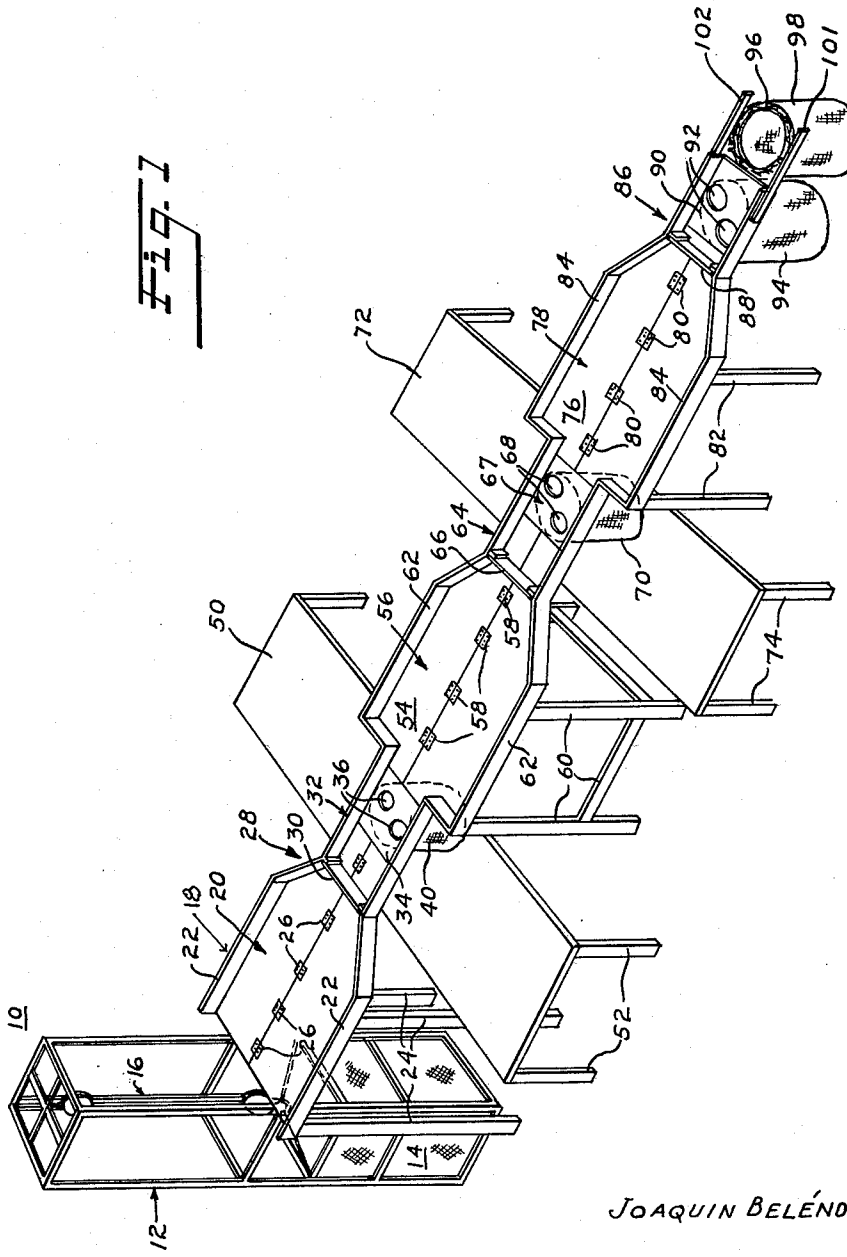
June 2, 1964 J. BELÉNDEZ-GARCIA 3,135,387

COCONUT CLASSIFIER

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Fig. 1



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Fig. 2

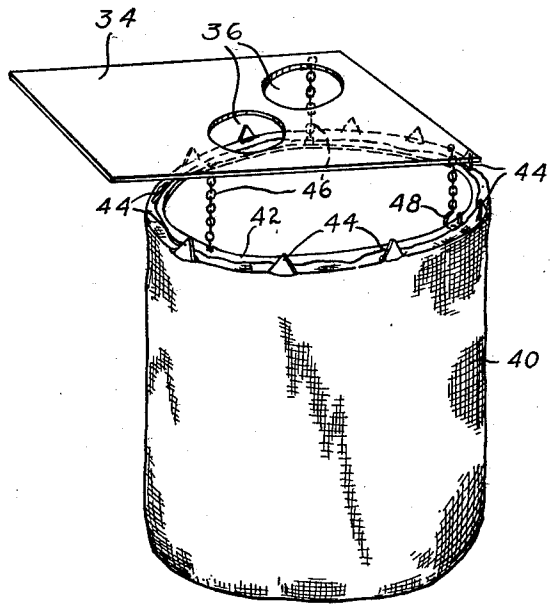
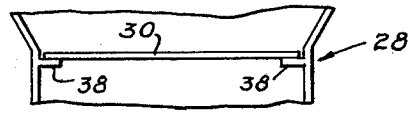


Fig. 3



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COCONUT CLASSIFIER

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1 Claim. (Cl. 209—123)

This invention relates to means for classifying coconuts and more particularly, to a means for classifying coconuts on a production line basis.

Coconuts have a number of peculiar characteristics which make the classification thereof more difficult than that of fleshy type fruits.

First of all, coconuts must be peeled to remove the outer protective shell and the first inspection or operation thereon in the classification process is a visual one in which improperly peeled coconuts must be set aside or discarded.

A quality check must also be performed on coconuts, prior to classification by the nominal diameter of the coconuts, which comprises a manual "knocking" of the coconuts one against another, whereby trained personnel can determine, by the sound generated, such characteristics as the degree of maturity, water content, degree of germination and the existence of possible ruptures in the shell.

Because of the odd shapes and large size of coconuts, the more conventional oscillating table sorters are not adaptable to coconut sorting and classifying operations. Men are required in each station of the system wherein a given nominal size is separated from the rest in order to properly handle the variety of shapes present in a group of coconuts. These shapes vary from oblong in smaller coconuts to nearly round in the larger sizes. Automatic machinery might possibly be constructed but the complexity and expense of the machinery would more than outweigh any advantage of complete automation.

It is, therefore, a primary object of this invention to provide means whereby coconuts may be classified on a production line basis.

Another object of this invention is to provide a coconut classifying apparatus which efficiently coordinates a plurality of manual manipulating and sorting operations.

Still another object of this invention is to provide means for classifying coconuts which is simple in construction and may be readily dismantled and transported from one place to another, thus being adaptable to the different field conditions of different coconut producers.

These and other objects of the invention will become apparent with reference to the following specification and drawings which relate to a preferred embodiment of the present invention.

In the drawings:

FIGURE 1 is a perspective of the invention;

FIGURE 2 is a detail of FIGURE 1; and

FIGURE 3 is a detail of FIGURE 1.

Referring now to FIGURE 1, the invention will be described in detail. Proceeding from left to right across the drawing, the first stage or section of the coconut classifier is shown as comprising an elevator or lift **10** including a framework **12** having a receptacle **14** therein which is adapted to be raised and lowered by a block and tackle arrangement **16**.

The next stage or second section of the classifier comprises a first coconut receiving table **18** including a surface **20** generally shaped like the cross-section of a funnel with raised sides **22**. The surface **20** of the receiving table abuts the frame **12** of the coconut elevator **10** whereby the receptacle **14** in the elevator may be raised and its contents emptied onto the surface **20** of the coconut table **18**. A frame **24** supports the table **18**.

The surface **20** of the first receiving table **18** is made foldable about its longitudinal axis by means of a plurality of hinges **26**.

The surface **20** is sloped downwardly away from the elevator **10** whereby coconuts placed thereon will gravitate toward the constricted portion **28** of the receiving table **18**. The coconuts are prevented from freely passing through the restricted portion **28** by means of a removable slat **30** which bridges the entrance of the said restricted portion.

The first classifying means **32** is removably mounted in the restricted portion **28** of the first receiving table **18** and includes a steel plate **34** or the like having a plurality of round holes **36** therein of a diameter equal to the smallest classification diameter desired. In the case of coconuts exportable from Puerto Rico, this diameter is three and one-quarter inches, but this diameter will vary in different countries and under differing requirements. As shown in FIGURES 2 and 3, where the numerals corresponding to those above will be used to describe the classifying means **32** as typical for the entire apparatus, the steel plates **34** are supported on integral ledges or brackets **38** in the surface of the restricted portion **28** of the first receiving table **18**. The surface of the restricted portion between the brackets **38** is cut away to permit coconuts of the desired size to pass through the holes **36** in the plate **34**.

As shown in FIGURE 2, a sack or bag **40** is suspended below the openings **36** in the plate **34** to receive coconuts passing therethrough. The bag **40** is supported by a bag holder comprising a circular metal ring **42** having a plurality of upstanding pointed detents **44** about the periphery thereof to engage the bag **40** and hold the same on the said ring **42**. The ring **42** is suspended below the steel plate **34** by means of three symmetrically disposed chains **46** or the like welded to the underside of the steel plate **34**. Two of these chains **46** are also welded to the circular metal ring **42** while the third chain is secured to the said ring **42** by means of a hook **48**. The use of the hook **48** provides an easy way of connecting and disconnecting the circular metal ring from one of the three chains to facilitate removal of the bag **40** from the bag holding means **42—44**.

Since in the embodiment shown and described herein the height of the first coconut receiving table **18** is in excess of nine feet from the ground, a platform **50**, whereon a workman or workmen may stand on either or both sides of the restricted portion **28** of the said table, is mounted beneath the restricted portion **28** on a ground supported framework **52**.

A second coconut receiving table **54**, of the same shape as the first table **18**, with a sloping foldable working surface **56** having a plurality of hinges **58** along the longitudinal axis thereof, is mounted on a ground-supported framework **60** such that the said surface **56** of the second receiving table **54** is an extension of the working surface

20 of the first receiving table 18. The second table 54 has raised sides 62 which converge at the lower end thereof in a second restricted portion 64. A removable slat 66 is positioned across the entrance of the restricted portion 64 to prevent free flow of coconuts therethrough.

As in the first restricted portion 28, a steel plate 67 having a plurality of holes 68 therein of the next largest nominal coconut diameter, four inches in this case, is mounted in the second restricted portion 64. A coconut receiving bag 70 is suspended below the plate 67 as hereinbefore described. Since the second restricted portion 64 is about five feet above the ground a second workman's platform 72 mounted on a ground supported frame 74 is positioned beneath the second restricted portion 64.

A third coconut receiving table 76, of the same shape as the first and second tables 18 and 54, respectively, with a sloping foldable working surface 78 having a plurality of hinges 80 along the longitudinal axis thereof, is mounted on a ground-supported framework 82 such that the said surface 78 of the third receiving table 76 is an extension of the working surface 56 of the second receiving table 54. The third table 76 has raised sides 84 which converge at the lower end thereof in a third restricted portion 86. A removable slat 88 is positioned across the entrance of the restricted portion 86 to prevent free flow of coconuts therethrough.

As in the first and second restricted portions 28 and 64, respectively, a steel plate 90 having a plurality of holes 92 therein of the largest nominal coconut diameter, four-and-one-half inches in this case, is mounted in the third restricted portion 86. A coconut receiving bag 94 is suspended below the plate 90 as hereinbefore described. Since the third restricted portion 86 is only about three feet above the ground no platform is necessary for the workman at this stage of the operation.

In addition to the classifying station comprising the plate 90 and the bag 94, the third restricted portion 86 is extended past this classifying station and terminates in a fourth bag holding ring 96 of the type hereinbefore described with a bag 98 attached thereto. A suitable bracket formed by elongated extensions 101 and 102 of the raised sides 84 of the third restricted portion 86 supports the bag holding ring 96 at the end of the third and final restricted portion of the apparatus. The bag 98 thereon receives all coconuts exceeding the largest nominal diameter of four-and-one-half inches.

Operation

Referring now to FIGURES 1, 2 and 3, the operation of the subject apparatus and the coconut classifying process are as follows:

Coconuts are first loaded into the elevator receptacle 14 and raised therein by the block and tackle 16 in the elevator 10 to the level of the working surface 20 of the first coconut receiving table 18. After being raised to this level, the coconuts are dumped onto the downwardly sloped surface 20 of the first work table 18 on which they gravitate into contact with the removable slat 30 at the entrance of the first restricted portion 28.

At this point, there are two workmen or operators positioned on the first workmen's platform 50, one workman on each side of the first restricted portion 28. One of the said workmen proceeds rapidly to manually "knock" the coconuts from the first work table and rapidly pass those coconuts deemed satisfactory to the second workman. The second workman proceeds to size these coconuts in the three and one-quarter inch holes 36 in the first classifying plate 34, whereby the smallest coconuts pass through the holes 36 into the first receiving bag 40 and the larger coconuts are allowed to roll on down the inclined surface 20 of the first work table onto the inclined surface 56 of the second receiving table 54 until they abut the removable slat 66 at the entrance of the second restricted portion 64.

At this position, a third workman on the second workmen's platform manually transfers the coconuts adjacent the removable slat 66 to the second classifying plate 67 wherein those coconuts having a diameter of between three-and-one-quarter inches and four inches will pass through the holes 68 therein and be deposited in the second receiving bag 70. Those coconuts which are larger than four inches in diameter are allowed to roll or are pushed, down the inclined working surface 56 of the second restricted portion 64 and onto the inclined working surface 78 of the third coconut receiving table 76 until they abut the removable slat 88 at the entrance of the third and final restricted portion 86.

At this position a fourth workman standing on the ground beside the third restricted portion 86 sizes these coconuts in the third classifying plate 90 whereby those coconuts having a diameter of between four inches and four-and-one-half inches are passed through the holes 92 in the plate 90 and deposited in the third receiving bag 94. Those coconuts which are larger than four-and-one-half inches in diameter are allowed to roll, or are pushed, down the inclined surface 78 of the third restricted portion 76 and through the bag holding ring 96 at the end thereof, whereby they are deposited in the fourth and final coconut receiving bag 98.

Additional workmen are provided at each station for the purpose of removing the coconut receiving bags and replacing them with empties as the bags are filled. As shown in FIGURE 3, the one chain 46 fastened to the hook 48 on the bag retaining ring 42 is unhooked and the bag 40 is either unhooked from the sharp detents 44 on the ring 42, if full, or impaled on the same detents 44 adjacent the upper open end of the bag if a new empty bag is being installed thereon. The said one chain 46 is subsequently refastened to the hook 48. A similar procedure is used for each classifying station for the removal and replacement of the coconut receiving bags.

When all of the coconuts have been sorted the apparatus can be dismantled, the receiving tables folded along the hinges 26, 58 and 80 and the apparatus may then be transported to another site.

As can be seen from the foregoing specification and drawings, this invention provides a much needed, novel, and economical method and means for sorting and classifying coconuts.

It is to be understood that the example shown and described herein is for the purpose of example only and is not intended to limit the scope of the appended claim.

What is claimed is:

Means for classifying large irregular shaped articles over a range of pre-selected nominal sizes comprising elevating means to raise a plurality of said articles above the ground, a plurality of receiving tables aligned with said elevating means, each of said receiving tables having a downwardly sloping, flat working surface, raised side portions and an enlarged upper end and a restricted lower end, classifying means attached to the restricted lower end of each of said receiving tables and to the enlarged upper end of the succeeding receiving table, said classifying means comprising a narrow, elongated surface which opens into the enlarged upper surface of each table, said receiving tables and restricted portions being coplanar and interconnected, the raised sides adjacent the lower end of each receiving table converging toward the restricted surface of the classifying means to provide a funnel through which said articles pass to the classifying means, a slat type baffle adjacent the lower end of the converging portion of the receiving tables for bridging the entrance of each of said restricted portions to prevent the free flow of articles down said working surface and through said restricted portion, a flat removable plate mounted in each restricted portion and having a plurality of holes therein of a predetermined nominal diameter whereby a manual sizing operation may be performed on said articles at each restricted portion, the diameter of said holes increasing at each successive restricted portion whereby said

articles may be progressively classified, means beneath each of said plates for receiving any of said articles small enough to pass through the holes in said plates, means at the exit end of that one of said restricted portions farthest from said elevation means for receiving any of said articles larger in size than the predetermined nominal diameter in the plate in the last one of said restricted portions, a bracket formed by extensions of the lower end of said raised side portions and means mounted on said bracket to receive those articles not previously classified, each of said flat working surfaces includes two longitudinally disposed separate sections, and a plurality of hinges connecting said separate sections along the longitudinal axis of each of said working surfaces whereby each of the said receiving tables may be folded to facilitate the transportation of the said classifying means from one place to another.

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