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D. TENNEY ET AL

COCONUT HUSING MACHINE

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Fig. 2.

Fig. 3.

[Diagram of coconut husking machine]

[Signature and seal of Dwight Tenney, the inventor.]
To all whom it may concern:

Be it known that we, Dwight Tenney and William D. Walsh, citizens of the United States, residing at Philadelphia, county of Philadelphia, State of Pennsylvania, and Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Coconut-Husking Machines, of which the following is a specification.

The objects of this invention are to provide in as simple form as possible, practical and efficient mechanism for removing the husks of coconuts and the like.

Heretofore this work has been performed by skilled labor which is both expensive and uncertain. In the present invention that part of the work which requires special skill and care is performed automatically and the only attention necessary is to see that the nuts are properly fed to the machine.

In the accompanying drawings there is illustrated a simple embodiment of the invention and this with the understanding that changes and modifications may be made in the structure without departing from the true spirit and scope of the invention.

Figure 1 in said drawings is a side elevation of the machine.

Figure 2 is a view looking at the left hand end of the machine shown in Figure 1, with the frame indicated in section.

Figure 3 is a detached perspective view of the feed slide.

Figures 4 and 5 are views illustrating operation of the feed slide and gripping mechanism.

Figure 6 is a detail perspective view of the knife operating mechanism.

Figures 7 to 11 are diagrammatic views illustrating operation of the husk splitting knives.

Figures 12 to 20 are further detail and partly diagrammatic views illustrating successive steps in the complete operation of the machine.

The machine comprises in the main, a pair of husk splitting knives 25, 26 arranged in back-to-back relation as shown in Figure 1, which are brought into engagement with the husk, in this condition, and then spread or separated to break open the husk. In the illustration these knives are each carried by a pair of supporting arms 27 pivoted at 28, at opposite sides of heads 29 carried by vertical guide rods 30 sliding in elongated bearings 31. These rods are weighted at their lower ends as indicated at 32, which weights preferably are adjustable to adapt the machine to different conditions.

The knives are operated from crank arms 33 on the reversely rotating shafts 34 spaced at opposite sides of the center line of the knives and carrying crank pins 35 connected by links 36 with pivot pins 37 on the upper ends of the knife carrying arms. As viewed in Figure 1, the left hand shaft 34 rotates in a counter-clockwise direction and the right hand shaft rotates clockwise, said shafts being driven in this particular disclosure by worm gears 38 thereon in mesh with worms 39 on the main drive shaft 40.

In the present disclosure the nuts are fed into position to be acted on by the knives by a carriage 41 sliding on the supporting frame 42, said carriage or feed slide carrying one or a series of husk penetrating spikes 43 and being reciprocated in proper time by an oscillating lever 44. This lever is shown as pivoted at its lower end at 45, as connected at its upper end with the slide by having a slotted portion 46 engaging over a transverse pin or rod 47 on the slide and as carrying a roll 48 engaging in a cam groove in cam 49 on the right hand shaft 34 (Figure 1).

The nuts are impaled on the supporting spikes 43 when the feed slide is in its outermost or retracted position (Figure 1) by means consisting in the illustration of an impaling spike 50 carried by a cross head 51 at the upper end of the vertically reciprocating rods 52 which are provided at their lower ends with rolls 53 riding on the cams 54, said rods being caused to follow the cam surfaces by the springs 55.

Usually the nuts are fed into the machine by hand, by bringing the relatively soft "stem" end of the husk into engagement with the impaling pin, while the parts are in the position shown in Figure 1. These cams 54 are so formed as to cause a sudden drop of the cross head carrying the impaling pin so as to drive the nut downward and impale the lower hard end of the husk on the supporting prongs or spikes 43. These operations are illustrated in Figures 12 and 13 and Figures 14 and 15 show how after the
hard end of the husk is forced down over the supporting pins on the feed carriage, the impaling pin is lifted clear of the husk, the pin 60 leaving the husk without disturbing the position of the nut because of the soft character of the husk at this upper stem end, and how the feed carriage is then advanced to carry the husk beneath the uplifted knives.

In this latter position, beneath the knives the nut is gripped in a pair of pincers consisting of jaws 56 pivoted at 57 substantially in line with the knives and beneath the cross bar 58 which carries the supporting prongs, these jaws having dependent arms 59 to which links 60 are pivotally connected, said links carrying rolls 61 in engagement with cams 62 on shafts 34. These jaws are sharpened or pointed so as to penetrate the husk, as indicated in Figure 16, substantially into engagement with the shell of the nut and they are timed usually to complete their closing movement after the descending knives have come into engagement with the stem end of the husk, and before they start to separate.

The operation of the knives will possibly be best understood from the diagrammatic Figures 7 to 11. In the first of these, the crank pins 35 are about to pass their upper centers and are traveling away from each other so as to lower the knives and at this time the knives are held in back-to-back engagement by reason of the downward pull offered by the weights 52. This figure corresponds approximately to Figure 16 as regards the position of the knives, which at this time are about to penetrate the husk. Figures 8 and 16 show how in the continued outward rotation of the crank pins the knives are lowered still further and how because of the pull of the weights they are held together in back-to-back relation as they penetrate the husk. The penetrating movement of the knives is limited either by engagement of the knives with the shell of the nut, as indicated in Figure 17, or by contact of the stop shoulders 63 on guide rods 30 with suitable stop shoulders 64 at the upper end of the bearings 31. These stop shoulders prevent the knives from lowering too far in case the nut is not of such a size as to stop the knives at the proper lower limit of movement. This construction, it will thus be seen, compensates for variations in the sizes of the nuts.

Figures 9 and 10 illustrate how in the continued rotation of the crank pins, after the knife blades have reached their lower limit of motion, the brackets 27 carrying the knives are spread by the links 36 to open out and break apart the two halves of the husk. In this connection see particularly Figure 18. In Figure 11 the cranks have swung toward each other past their lower centers, this motion bringing the blades together in the original back-to-back relation and the continued rotation serving then to elevate the blades in this condition, ready for the next operation.

As the blades are closed and lifted, as indicated in Figures 19 and 20, the feed slide is retracted so as to withdraw the nut, which with the broken husk may be removed by hand or otherwise from the machine, the cycle of operations being then repeated.

The pincers which hold the nut positioned for the splitting knives may retract practically as soon as the knives obtain a proper grip on the husk, or may remain in contact with the shell of the nut until the halves of the husk have been entirely broken apart, as in Figure 18.

The penetration of the husk at the top and the bottom in the manner illustrated provides lines of weakness which enable the knives to readily break apart the two halves of the husk.

An especially important feature of the impaling pin is that it locates or positions the soft stem end of the husk so that when the nut is advanced, the soft stem is directly beneath the center line of the knives and in the plane of their operation. This device thus in effect centers the nuts with their lines of weakness in the operating plane of the knives. The downward stroke of this positioning device may be cushioned for instance by yieldingly mounting the lower set of supporting pins 43 on a spring or springs such as indicated at 70 in Figure 3.

The upward stroke of the knives may be eased somewhat, if found desirable, by providing an auxiliary cam, for instance, for relieving the knives of the weights 32 during the upward or return movement.

What we claim is:

1. In a machine of the character described, cooperating relatively separable knives and means for driving said knives in closely adjacent relation into an object and for then separating the knives at their outer ends to split apart portions of the object.

2. In a machine of the character described, penetrating members and means for driving said members in closely adjacent relation into an object and for then separating the members at their outer ends to split apart portions of the object.

3. In a machine of the character described, penetrating members, stops, means for driving said members in closely adjacent relation into an object and for then engaging the stops thereby separating the members at their outer ends, said means including oppositely rotating crank arms disposed at opposite sides of a center line between the members and link connections from said crank arms to the respective members.
4. In a machine of the character described, penetrating members, means for driving said members in closely adjacent relation into an object and for then separating the members, said means including oppositely rotating crank arms disposed at opposite sides of a center line between the members, link connections from said crank arms to the respective members, a head to which the members are pivotally connected and a weight operating on said head.

5. In a machine of the character described, penetrating members, means for driving said members in closely adjacent relation into an object and for then separating the members, said means including oppositely rotating crank arms disposed at opposite sides of a center line between the members, link connections from said crank arms to the respective members, a head to which the members are pivotally connected and means for applying force to said head.

6. In a machine of the character described, a vertically operating guide, a pair of arms pivotally connected to the upper end of said guide, a penetrating member carried by each of said arms and spreading means operatively connected with the pivotally supported arms.

7. In a machine of the character described, a vertically operating guide, husk splitting knives pivoted at their lower ends on said guide, cranks arranged at opposite sides of the plane of said guide, pivotal link connections from said cranks to the upper ends of the knives and a tensioning means applied to said guide.

8. In a machine of the character described, a vertically operating guide, husk splitting knives pivoted at their lower ends on said guide, cranks arranged at opposite sides of the plane of said guide, pivotal link connections from said cranks to the upper ends of the knives and a weight applied to said guide.

9. In a machine of the character described, a vertically operating guide, husk splitting knives pivoted at their lower ends on said guide, cranks arranged at opposite sides of the plane of said guide, pivotal link connections from said cranks to the upper ends of the knives and means for applying a variable tension to said guide.

10. In a machine of the character described, a vertically operating guide, husk splitting knives pivoted at their lower ends to the upper end of said guide, cranks arranged at opposite sides of the plane of said guide, pivotal link connections from said cranks to the upper ends of the knives, the downward stroke of said guide being normally limited by the resistance to penetration of a coconut husk by the knives and cooperating stops for determining the maximum lowering motion of the knives.

11. In a machine of the character described, a horizontally reciprocating carriage, vertically reciprocating knives, means for holding an object on said carriage in position to be operated on by the knives and means for forcing said knives into an object positioned on the carriage and for then relatively spreading the knives apart.

12. In a machine of the character described, a reciprocating feed carriage provided with supporting spikes, means for impaling an object on said spikes and penetrating and spreading knives arranged to operate on the object impaled on said spikes.

13. In a machine of the character described, a reciprocating feed carriage provided with supporting spikes and penetrating and spreading knives arranged to operate on an object impaled on said spikes, the said impaling means being positioned to form a line of weakness in the object at substantially the point where the object is engaged by the knives.

14. In a machine of the character described, a reciprocating feed carriage provided with supporting spikes, penetrating and spreading knives arranged to operate on an object impaled on said spikes, the said impaling means comprising a reciprocating cross head and means for operating the same to drive an object down over the supporting spikes while the carriage is in a retracted position.

15. In a machine of the character described, a reciprocating feed carriage, means on one of the shafts for operating said carriage, a supporting element on the carriage and means operated by one of the shafts for engaging an object with the supporting element.

16. In a machine of the character described, reversely rotating shafts, cranks carried thereby, a pair of splitting knives standing normally in back-to-back relation, link connections from said cranks to said splitting knives, a reciprocating feed carriage, means on one of the shafts for operating said carriage, a supporting element on the carriage and means operated by one of the shafts for engaging an object with the supporting element.

17. In a machine of the character described, reversely rotating shafts, cranks carried thereby, a pair of splitting knives standing normally in back-to-back relation, link connections from said cranks to said splitting knives, a reciprocating feed carriage, means on one of the shafts for operating said carriage, a supporting element on the carriage and means operated by the other of said shafts for engaging an object with the supporting element.

18. In a machine of the character described, a horizontally reciprocating carriage, vertically reciprocating knives, means for holding an object on said carriage in position to be operated on by the knives and means for forcing said knives into an object positioned on the carriage and for then relatively spreading the knives apart.
scribed, reversely rotating shafts, cranks carried thereby, a pair of splitting knives standing normally in back-to-back relation, link connections from said cranks to said splitting knives, a reciprocating feed carriage, means on one of the shafts for operating said carriage, a supporting element on the carriage, means operated by one of the shafts for engaging an object with the supporting element, gripper mechanism and means operated from said shafts for actuating said gripper mechanism to engage an object on the feed carriage when the same is in the operating plane of the knives.

19. In a machine of the character described, husk splitting mechanism, a feed carriage for carrying the objects to said splitting mechanism, supporting spikes on said carriage and a reciprocatory means for impaling an object on said spikes while the carriage is in a retracted position.

20. In a machine of the character described, husk splitting mechanism, a feed carriage for carrying the objects to said splitting mechanism, supporting spikes on said carriage and means for impaling an object on said spikes while the carriage is in a retracted position, said means including a vertically reciprocating cross head positioned to one side of the operating plane of the splitting mechanism.

21. In a machine of the character described, husk splitting mechanism, a feed carriage for carrying the objects to said splitting mechanism, supporting spikes on said carriage, means for impaling an object on said spikes while the carriage is in a retracted position, said means including a vertically reciprocating cross head positioned to one side of the operating plane of the splitting mechanism and a spike carried by said cross head to penetrate the object at a point substantially opposite the supporting spikes.

22. In a machine of the character described, husk splitting mechanism including cooperating jaws adapted to penetrate the sides of an object and gripper mechanism for holding the object in position to be operated on by said splitting mechanism.

23. In a machine of the character described, husk splitting mechanism, gripper mechanism for holding an object in position to be operated on by said splitting mechanism, said gripper mechanism including cooperating jaws adapted to penetrate the husk and means for automatically forcing said jaws through the husk substantially into engagement with the shell of a coconut.

24. In a machine of the character described, husk splitting mechanism, a feed carriage provided with a coconut supporting base and gripper jaws supported substantially at the plane of the splitting mechanism and arranged to pass about the supporting base on the feed carriage into engagement with opposite sides of a coconut thereon.

25. In a machine of the character described, husk splitting mechanism, cooperating pivoted jaws, a feed carriage provided with a nut supporting bar, means for shifting the carriage into position with said bar overstanding the pivotal support of the gripper jaws and means for swinging said jaws about the opposite sides of said bar into engagement with a nut supported thereon.

26. In a machine of the character described, oppositely rotating shafts, cranks on said shafts, a reciprocating guide between said shafts, knives pivotally supported on said guide, pivotal links extending from the cranks to said knives, a reciprocating feed carriage beneath the knives, cam mechanism on one of the shafts for actuating said feed carriage, gripper devices supported beneath the carriage in substantially the operating plane of the knives and cam devices on the shafts for operating said gripper devices.

27. In a machine of the character described, oppositely rotating shafts, cranks on said shafts, a reciprocating guide between said shafts, knives pivotally supported on said guide, pivotal links extending from the cranks to said knives, a reciprocating feed carriage beneath the knives, cam mechanism on one of the shafts for actuating said feed carriage, gripper devices supported beneath the carriage in substantially the operating plane of the knives, cam devices on the shafts for operating said gripper devices, nut supporting spikes on the feed carriage, a vertically reciprocating mechanism for impaling the nuts on said spikes and cam mechanism on one of the shafts for operating said impaling device.

28. In a machine of the character described, vertically reciprocating knives, a feed carriage beneath said knives, gripper devices beneath said feed carriage in substantially the operating plane of the knives and means for vertically reciprocating and relatively separating the knives.

29. In a machine of the character described, vertically reciprocating knives, a feed carriage beneath said knives, gripper devices beneath said feed carriage in substantially the operating plane of the knives, means for vertically reciprocating and relatively separating the knives, said means including a vertically reciprocating guide to which the knives are connected and crank members connected with the knives.

30. In a machine of the character described, oppositely rotating cranks, a vertically reciprocating guide between said
cranks, knives pivoted to the upper end of said guide and pivotal links extending from the cranks to the upper ends of said knives.

31. In a machine of the character described, oppositely rotating cranks, a vertically reciprocating guide between said cranks, knives pivoted to the upper end of said guide and pivotal links extending from the cranks to the upper ends of said knives, said guide having a weighted member depending therefrom.

32. In a machine of the character described, oppositely rotating cranks, a vertically reciprocating guide between said cranks, knives pivoted to the upper end of said guide and pivotal links extending from the cranks to the upper end of said knives, said knives normally abutting in back-to-back engagement.

33. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement and means for forcing the knives in such relation into the husk of a coconut and for then relatively separating the same to split apart the husk of the nut, and gripper devices for temporarily holding the nut while being operated on by the knives.

34. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement, automatically compensating means for forcing said knives in such relation into penetrating engagement with the husks of coconuts of different size and means for automatically spreading the knives at their outer ends after said husk penetrating operation, and gripper devices for temporarily holding the nut while being operated on by the knives.

35. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement, automatically compensating means for forcing said knives in such relation into penetrating engagement with the husks of coconuts of different size, means for automatically spreading the knives at their outer ends after said husk penetrating operation, and gripper devices for temporarily holding the nut while being operated on by the knives.

36. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement, automatically compensating means for forcing said knives in such relation into penetrating engagement with the husks of coconuts of different size, means for automatically spreading the knives at their outer ends after said husk penetrating operation and means for automatically feeding nuts into position to be acted on by said knives.

37. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement, automatically compensating means for forcing said knives in such relation into penetrating engagement with the husks of coconuts of different size, means for automatically spreading the knives at their outer ends after said husk penetrating operation, means for automatically feeding nuts into position to be acted on by said knives and means for temporarily holding the nuts while being operated on by the knives.

38. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement, automatically compensating means for forcing said knives in such relation into penetrating engagement with the husks of coconuts of different size, means for automatically spreading the knives after said husk penetrating operation, means for automatically feeding nuts into position to be acted on by said knives and devices for positioning the nuts on said feeding means.

39. In a machine of the character described, husk splitting knives standing normally in back-to-back engagement, automatically compensating means for forcing said knives in such relation into penetrating engagement with the husks of coconuts of different size, means for automatically spreading the knives after said husk penetrating operation, means for automatically feeding nuts into position to be acted on by said knives, devices for positioning the nuts on said feeding means and means for temporarily supporting the thus positioned nuts while being operated on by the knives.

40. In a machine of the character described, vertically reciprocating guides, cooperating knives pivoted in back-to-back relation on the upper ends of said guides, means for vertically reciprocating and relatively separating said knives, including two pairs of reversely rotating cranks and connections from the cranks to the knives.

41. In a machine of the character described, penetrating members, means for driving said members in closely adjacent relation into an object and for then separating the members, said means including oppositely rotating crank arms disposed at opposite sides of a center line between the members, link connections from said crank arms to the respective members, a head to which the members are pivotally connected and a weight or equivalent means operating on said head.

42. In a machine of the character described, a traveling conveyer, reciprocating knives, means for holding an object on said conveyer in position to be operated on by the knives and means for forcing said knives into an object thus positioned on the conveyer and for then relatively spreading the knives apart while in the object.
43. In a machine of the character described, a conveyer yielding husk supporting spikes carried by said conveyer and husk splitting means for operating on a nut supported on said spikes.

44. In a machine of the character described, yieldingly supported spikes and a power device for driving a coconut husk on to said spikes.

In testimony whereof we affix our signatures.

DWIGHT TENNEY.

WILLIAM D. WALSH.