June 21, 1938. J. CRIGHTON 2,121,186

OPENING OF COLLAPSED SHELLS OF SLIDE AND SHELL CONTAINERS

Filed Nov. 18, 1936 2 Sheets-Sheet 1

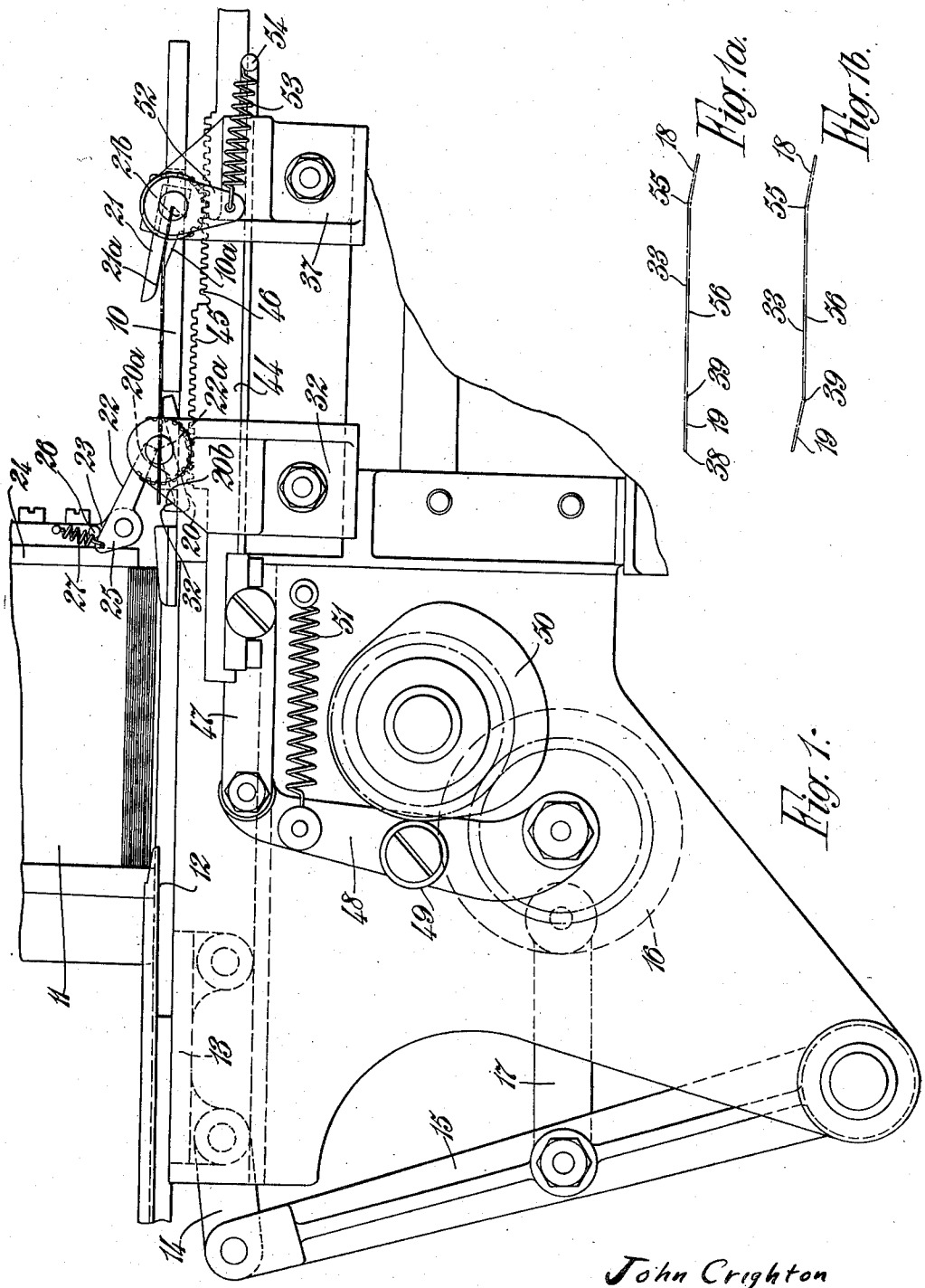


Fig. 1.

Fig. 1a.

Fig. 1b.

John Crighton
Inventor
by George S. Hastings
Atty.

June 21, 1938. J. CRIGHTON 2,121,186

OPENING OF COLLAPSED SHELLS OF SLIDE AND SHELL CONTAINERS

Filed Nov. 18, 1936 2 Sheets-Sheet 2

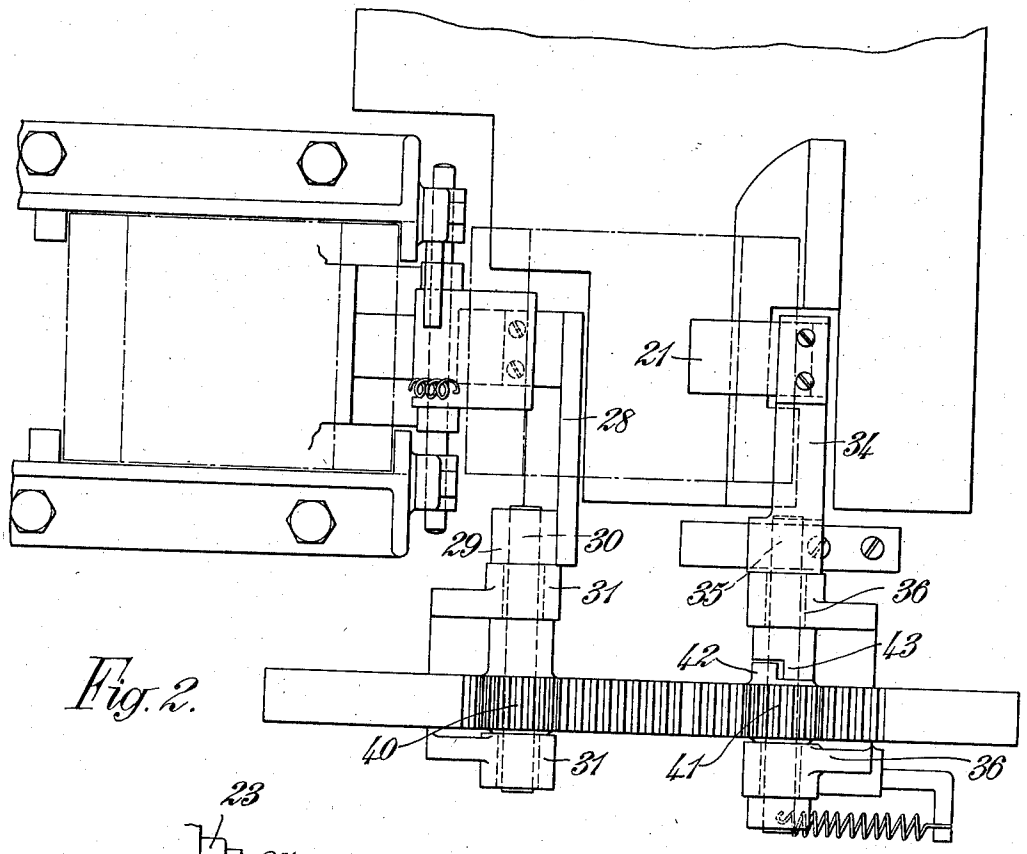


Fig. 2.

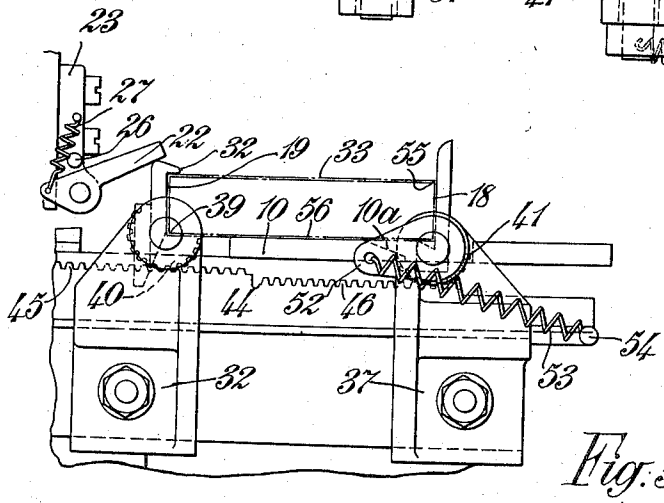


Fig. 3.

John Crighton
by
George S. Hastings
Atty.

Patented June 21, 1938

2,121,186

UNITED STATES PATENT OFFICE

2,121,186

OPENING OF COLLAPSED SHELLS OF SLIDE AND SHELL CONTAINERS

John Crighton, London, England, assignor to American Machine & Foundry Company, New York, N. Y., a corporation of New Jersey

Application November 18, 1936, Serial No. 111,420
In Great Britain November 20, 1935

13 Claims. (Cl. 93—53)

This invention relates to the packings for cigarettes and other articles of the type wherein the packing comprises a slide and shell, and the invention has particular reference to the shell opening or erecting mechanism by which a collapsed shell is opened or erected ready for the insertion of a loaded slide.

Prior constructions of shell opening or erecting means have involved more or less complicated mechanism requiring a number of operations and it is an object of the present invention to provide improved and simplified mechanism in which the number of operations to effect an opening or erection of the shell is reduced to a minimum.

According to the invention, the shell opening means comprises a plurality of co-operating elements which are mounted for rotation and said elements are coupled to a reciprocating operating bar or member whereby movement of said rotary elements to effect opening of the shell is effected by a single movement of said operating member.

The invention consists in a method of opening collapsed shells of slide and shell containers, comprising imparting an initial bending movement to the short sides of the shell about the crease lines and towards the broad sides while preventing an opening movement of said broad sides and continuing the bending movement while permitting a free movement of the broad sides away from one another.

The invention also consists in means for opening collapsed shells of slide and shell containers comprising a plurality of co-operating shell engaging devices mounted for rotation and means for actuating said devices comprising a reciprocating member operatively coupled to said elements.

The shell engaging devices may be rotated by pinions meshing wtih a reciprocating rack bar.

The invention also consists in means for opening collapsed shells of slide and shell containers comprising a table or support for the collapsed shell, a pivotally mounted shell engaging element located adjacent one edge of the table and forming a stop for locating the shell on the table, a pivotally mounted shell engaging element adjacent the opposite edge of the table and adapted to impart an erecting or opening movement to the shell and means for rotating said elements.

Further features of the invention will be hereinafter described and defined in the claims.

In the accompanying drawings:—

Figure 1 is a side view of a shell opening machine according to the invention.

Figures 1*a* and 1*b* are diagrams showing certain steps in the opening of a shell.

Figure 2 is a plan corresponding to Figure 1, certain parts being left out.

Figure 3 is a partial elevation showing the essential parts in the "shell opened" position.

In carrying the invention into effect according to one convenient mode a stationary table or support 10 is provided onto which the collapsed shells are adapted to be fed from a stack or magazine 11. The lowermost shell is fed from the stack by means of a reciprocating feeding tooth 12 which is mounted upon a carriage 13 connected by a link 14 to a pivoted lever 15. The lever is oscillated by a crank disc 16 to which it is connected by a rod 17.

The direction of feed of the collapsed shells is at right angles to the axis of the shell.

When in position on the table the collapsed shell lies so that the narrow wall 18 at the leading edge i. e. to the right as seen in Figure 1*a* lies uppermost and the corresponding wall 19 at the trailing edge lies beneath.

Associated with the table 10 are three elements 20, 21, 22 which are mounted to rotate upon axes lying parallel to the walls of the shell, i. e. at right angles to the direction of feed. The elements 21 and 20 are of angular form and are located adjacent the forward and rear ends of the table respectively. The element which forms a resilient abutment 22 is pivotally mounted upon a bracket 23 conveniently carried by the forward wall 24 of the magazine. The abutment element 22 lies above the element 20 and is provided with a tail portion 25 normally abutting against a stop pin 26 by means of the returning spring 27.

The element 20 (referred to hereinafter as the shell erecting element) is of angular form having walls 20*a* and 20*b* which are substantially at right angles. The shell erecting element 20 is pivotally mounted on an axis beyond the end of the table 10 but in the plane of the top of the table. For this purpose the element is mounted upon an arm 28 having a boss 29 fixed upon a spindle 30 which is carried in bearings 31 in a bracket 32. Normally the shell erecting element 20 lies with the long wall 20*a* downwardly inclined and with the short wall 20*b* projecting upwardly, the nose 32, however, lying beneath the plane of the table so that it offers no obstruction to the feeding of the shells.

The element 21 (hereinafter referred to as the shell locating element) is also of angular form having walls 21*a* and 21*b* which enclose an acute angle. The longer wall 21*a* overlaps the end of

the table with the shorter wall projecting downwardly. This element is pivotally mounted on an axis coinciding with the apex of the angle formed by the walls 21*a* and 21*b*, such axis being somewhat below the plane of the table.

The upper surface of the table adjacent the shell locating element 21 is inclined downwardly at 10*a* so that on insertion of a collapsed shell the edge will engage the wall 21*a* and be directed downwardly until such edge engages in the angle between the walls 21*a*, 21*b* in which position the narrow wall 18 of the shell will be bent out of alignment with the upper broad wall 33 of the shell as indicated diagrammatically in Figure 1*a*.

The shell locating element 21 is adapted to be rotated and is carried by an arm 34 mounted upon a spindle 35 carried in bearings 36 in the bracket 37.

When a collapsed shell is in position on the table its rear edge 38 lies substantially vertically above the angle of the shell erecting element 20. The narrow wall 19 at this end of the shell lies beneath and the hinge crease line 39 lies adjacent or coincident with the axis of rotation of the shell erecting element 20.

The abutment element 22 normally lies so that its edge 22*a* will lie above the crease line 39 of an inserted shell and in engagement with the broad wall 33 against which it is pressed by the spring 27.

Rotation of the shell erecting elements 20 and the shell locating element 21 is effected by means of pinions 40, 41 of which 40 is mounted upon the spindle 30 while 41 is free on the spindle 35 but is provided with a projection or tooth 42 adapted for engagement with a projection or tooth 43 on the spindle 35.

The pinions mesh with a rack bar 44 having racks 45, 46. The rack bar 44 is guided for reciprocation and is connected by a link 47 to a pivoted lever 48 having a roll 49 which engages a rotary cam 50. The return movement of the rack bar is effected by the spring 51.

The provision of the co-operating teeth 42, 43 permits a delay in the rotary movement of the shell locating element 21 and in order to hold the element in its normal position with its wall 21*a* engaging or closely adjacent the upper surface of the table, the spindle 35 is provided with an arm 52 to which a spring 53 is attached, the other end of the spring being anchored on a pin 54.

In operation, a collapsed shell is fed onto the table 10 until the leading edge engages in the angle of the locating element 21. In this position the forward edge of the shell is bent downwardly in a position in which the upper narrow wall 18 is bent about the crease line 55 relatively to the upper broad wall 33 as indicated in Figure 1*a*. At the trailing end the edge 22*a* of the abutment element 22 which is located at a distance from the table substantially equal to the thickness of the collapsed shell engages the wall 33 immediately above the crease line 39. On the cam 50 operating, the rack bar 44 is moved to the left (Figure 1).

This rotates the pinions 40 and 41. The rotation of pinion 40 causes the erecting element 20 to rotate and engage the wall 19 of the shell and bend up said wall about the crease line 39 against the pressure of the element 22 (see Figure 1*b*). Continued movement of shell erecting element 20 brings the nose 32 into engagement with abutment element 22 whereby the latter is lifted clear of the opening shell and permitting the wall 33 to rise away from the lower broad wall 56. It is to be noted that the wall 20*b* of the shell erecting element is spaced from the axis of rotation a distance equal to the wall 19 (see Figure 3).

During the initial movement of the pinion 41 no movement of the locating element 21 occurs, until the projections 42, 43 engage whereupon the element is rotated to permit the wall 18 of the shell to open away from the lower wall 56.

The elements 20, 21 continue their rotary movement until the shell is finally erected as indicated in Figure 3, whereupon the opened or erected shell is removed by any suitable means, by a movement in the direction of its length.

The parts then return to their original position ready for the insertion of another collapsed shell. Instead of a rack and pinion drive for rotating the elements 20, 21, the latter may be provided with any well known or suitable operating device for producing the desired movement.

What is claimed is:

1. The method of opening collapsed shells of slide and shell containers, comprising imparting an initial bending movement to the short sides of the collapsed shell about the crease lines and toward the broad sides by advancing the collapsed shell positively against an opposed gradually retiring force, while preventing initially an opening movement of said broad sides and then permitting an initial opening movement of the upper broad side and concurrently applying a bending force at the trailing creased edge joint of said shell, to erect said trailing edge, while permitting a free movement of the broad sides away from one another, and thereby erecting positively the remote short edge of the partly opened shell against said constantly opposed retiring force.

2. Means for opening collapsed shells of slide and shell containers, comprising a plurality of co-operating shell-engaging devices mounted for rotation, means to rotate one of said devices upward toward a short side of the shell, and means to rotate the other device upward and away from the opposite short side of the shell, whereby said rotatable devices are adapted to apply oppositely directed erecting forces against the short sides of said collapsed shells substantially throughout the period of effective erection, and means for actuating said device rotating means comprising a reciprocating member operatively coupled to said elements.

3. Means for opening collapsed shells of slide and shell containers, having the features claimed in claim 2, in which said means for rotating said devices comprises a pinion on each of said rotating devices, and a rack common to both of said pinions, and means for reciprocating said rack.

4. Means for opening collapsed shells of slide and shell containers, comprising a support for the collapsed shell, a pivotally mounted shell engaging element located adjacent one edge of the support and forming a stop for locating the shell on the support, a pivotally mounted shell engaging element adjacent the opposite edge of the support and adapted to impart an erecting movement to the shell and means for rotating both of said elements, each acting to exert erective pressure progressively against one of said edges.

5. Means for opening collapsed shells of slide and shell containers, as claimed in claim 4, wherein the shell locating element is pivoted on an axis below the plane of the support and partially overlaps the support whereby the col-

lapsed shell is given an initial downwardly bending movement about the crease line of the adjacent narrow wall of the shell.

6. Means for opening collapsed shells of slide and shell containers, as claimed in claim 4, wherein the shell locating element is pivoted on an axis below the plane of the support and partially overlaps the support whereby the collapsed shell is given an initial downwardly bending movement about the crease line of the adjacent narrow wall of the shell and wherein a pivoted abutment element is provided adapted to engage the upper surface of the collapsed shell at a point coinciding with the crease line of the trailing narrow wall of the shell, said element providing an abutment whereby the shell is given an upward bend about said crease line when the shell erecting element is rotated.

7. Means for opening collapsed shells of slide and shell containers, as claimed in claim 4, wherein the shell locating element is pivoted on an axis below the plane of the support and partially overlaps the support whereby the collapsed shell is given an initial downwardly bending movement about the crease line of the adjacent narrow wall of the shell and wherein a pivoted abutment element is provided adapted to engage the upper surface of the collapsed shell at a point coinciding with the crease line of the trailing narrow wall of the shell, said element providing an abutment whereby the shell is given an upward bend about said crease line when the shell erecting element is rotated, said abutment element being spring pressed and being moved clear of the shell after said upward bending movement by the engagement therewith of a projection on the shell erecting element.

8. Means for opening collapsed shells of slide and shell containers as claimed in claim 4, wherein the shell engaging elements are of angular form, the angle of the shell locating element being acute while that of the shell erecting element is substantially a right angle.

9. Means for opening collapsed shells of slide and shell containers as claimed in claim 4, wherein the shell locating element and the shell erecting element are mounted upon spindles provided with pinions meshing with a rack element and means for reciprocating said rack element to impart rotary movements to the shell engaging elements.

10. Means for opening collapsed shells of slide and shell containers as claimed in claim 4, wherein the shell locating element and the shell erecting element are mounted upon spindles provided with pinions meshing with a rack element and means for reciprocating said rack element to impart rotary movements to the shell engaging elements and wherein lost motion means are provided between the shell locating element and its pinion, whereby the rotation of said element is delayed until the shell erecting element has imparted a bending up movement to the associated narrow wall of the shell.

11. Means for opening collapsed shells of slide and shell containers as claimed in claim 4, wherein the shell locating element and the shell erecting element are mounted upon spindles provided with pinions meshing with a rack element and means for reciprocating said rack element to impart rotary movements to the shell engaging elements wherein the rack is reciprocated by rotary cam controlled means.

12. Means for opening collapsed shells of slide and shell containers as claimed in claim 4, wherein the shell locating element and the shell erecting element are mounted upon spindles provided with pinions meshing with a rack element and means for reciprocating said rack element to impart rotary movements to the shell engaging elements wherein the rack is reciprocated by rotary cam controlled means and wherein the collapsed shell is fed to the support by a reciprocating tooth feed operated from a crank actuated by said cam shaft.

13. A method of opening collapsed shells of slide and shell containers, comprising the step of applying an advancing erective force against one creased edge of the collapsed shell, and applying an opposed gradually retiring erective force against the oppositely facing creased edge of the collapsed shell, and continuing the application of said opposed advancing and retiring erective forces progressively until the shell is completely erected.

JOHN CRIGHTON.