March 14, 1967 C. J. BERGH, JR 3,308,723

APPARATUS FOR SLITTING AND SCORING CARTON BLANKS

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FIG. 1

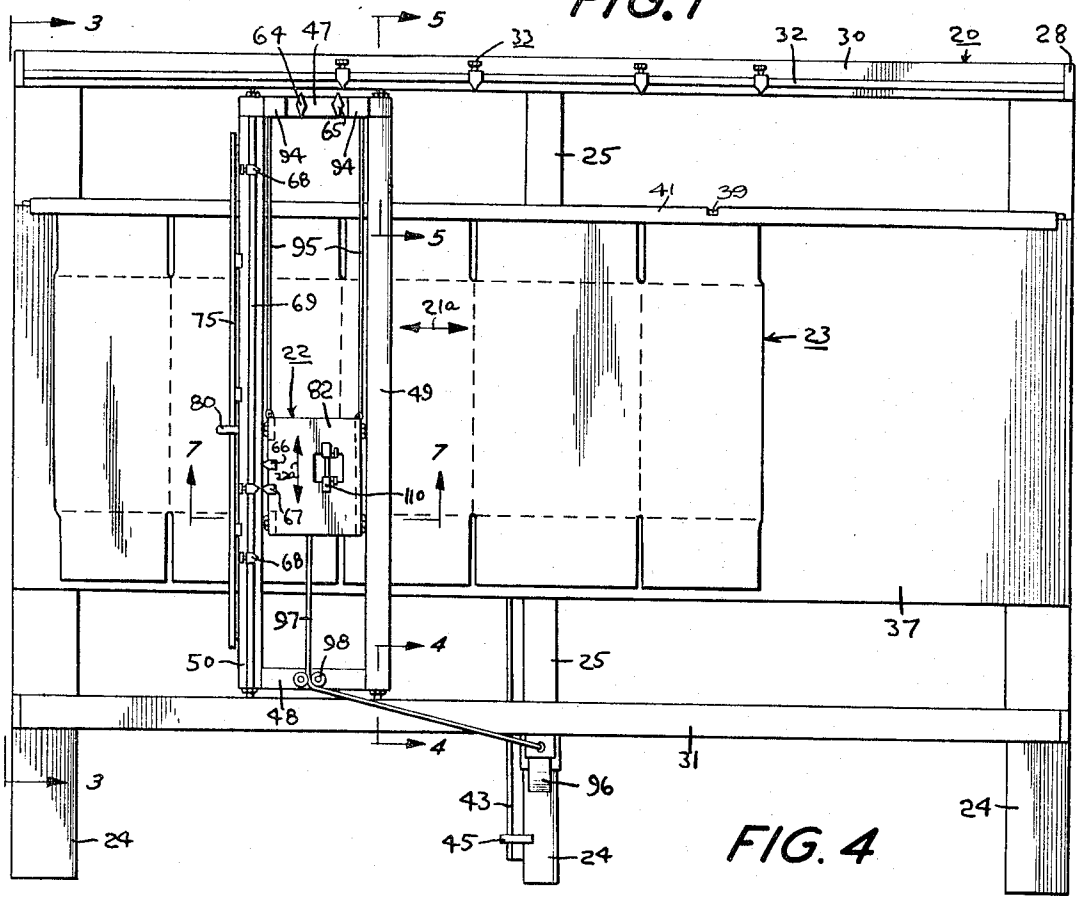


FIG. 4

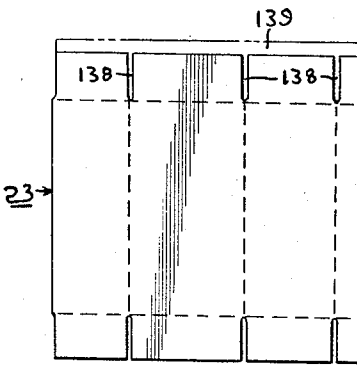
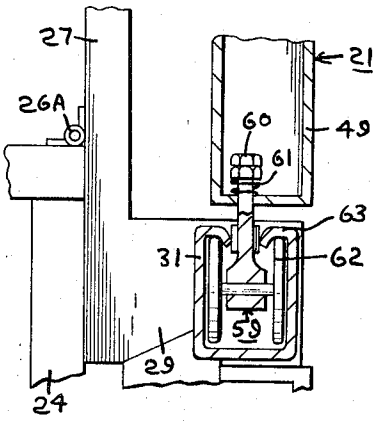


FIG. 2



INVENTOR
CHARLES J. BERGH, JR.

BY Lew Edelson

ATTORNEY

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FIG. 3

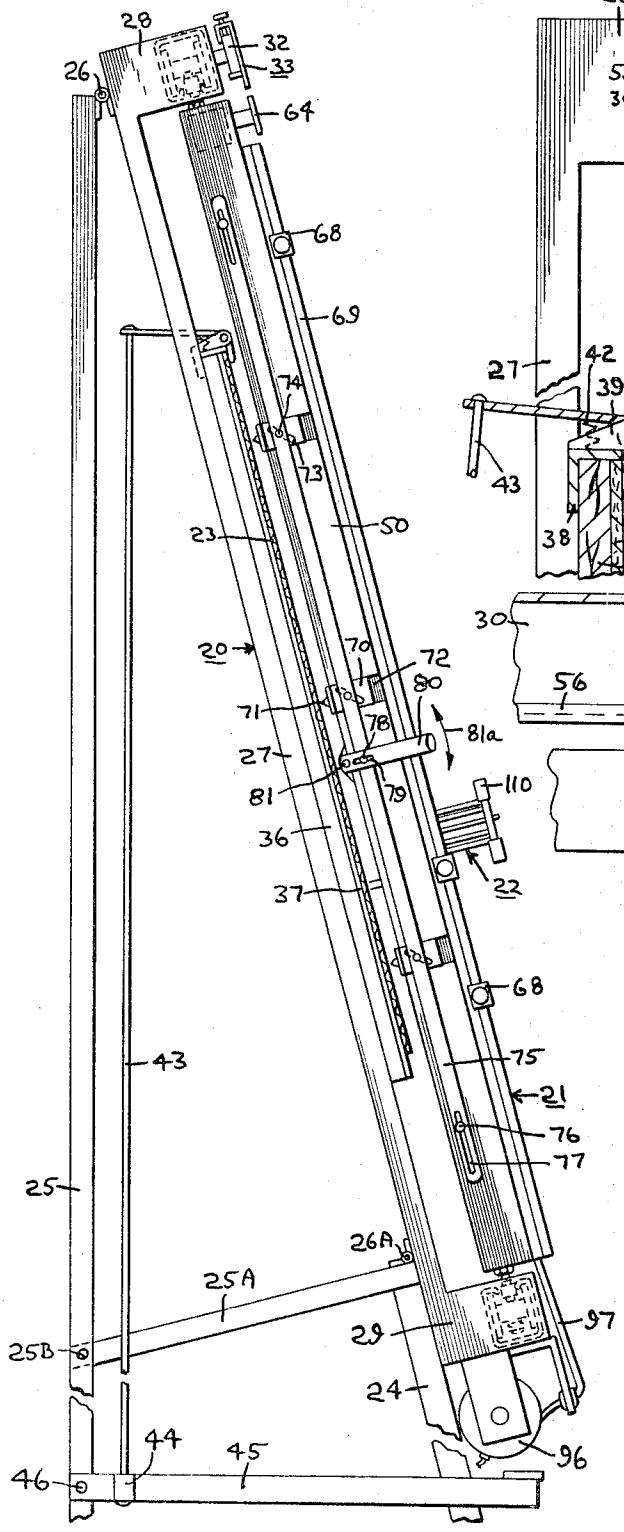
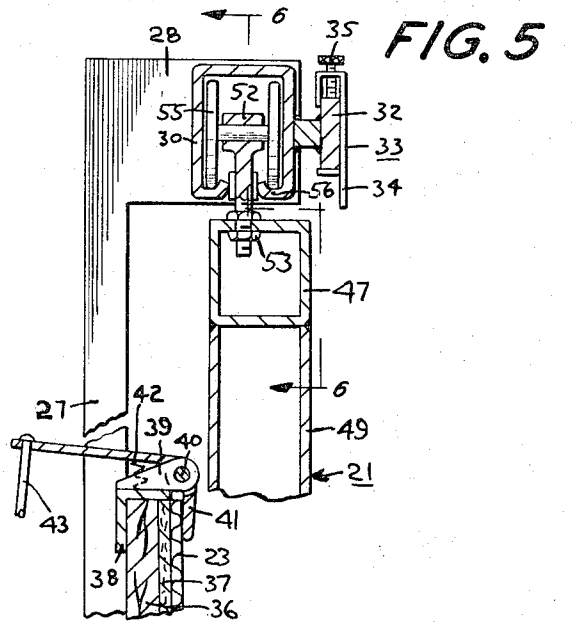


FIG. 5



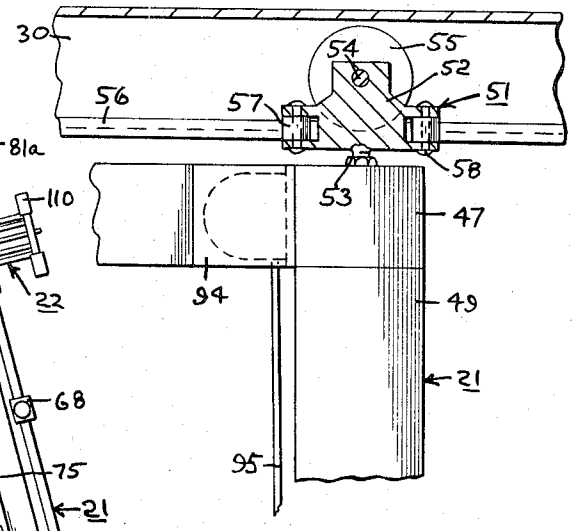


FIG. 6

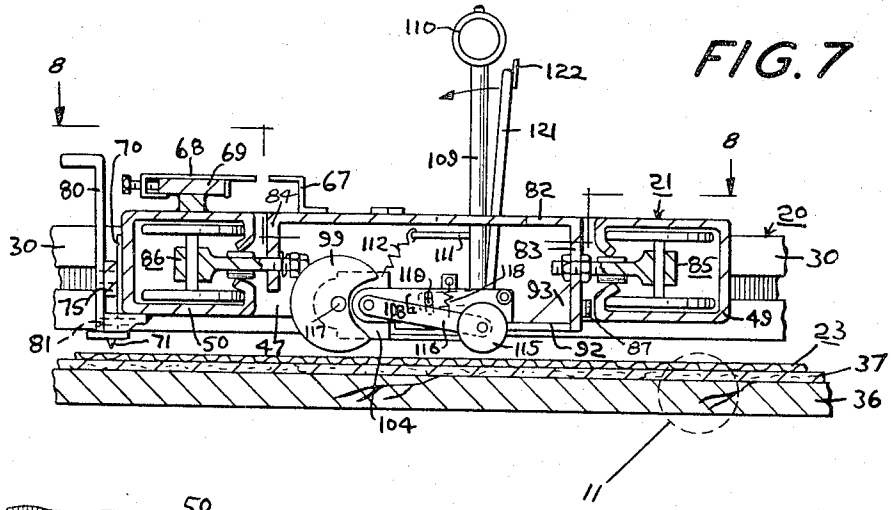
INVENTOR
CHARLES J. BERGH, JR.
BY
ATTORNEY

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FIG. 7



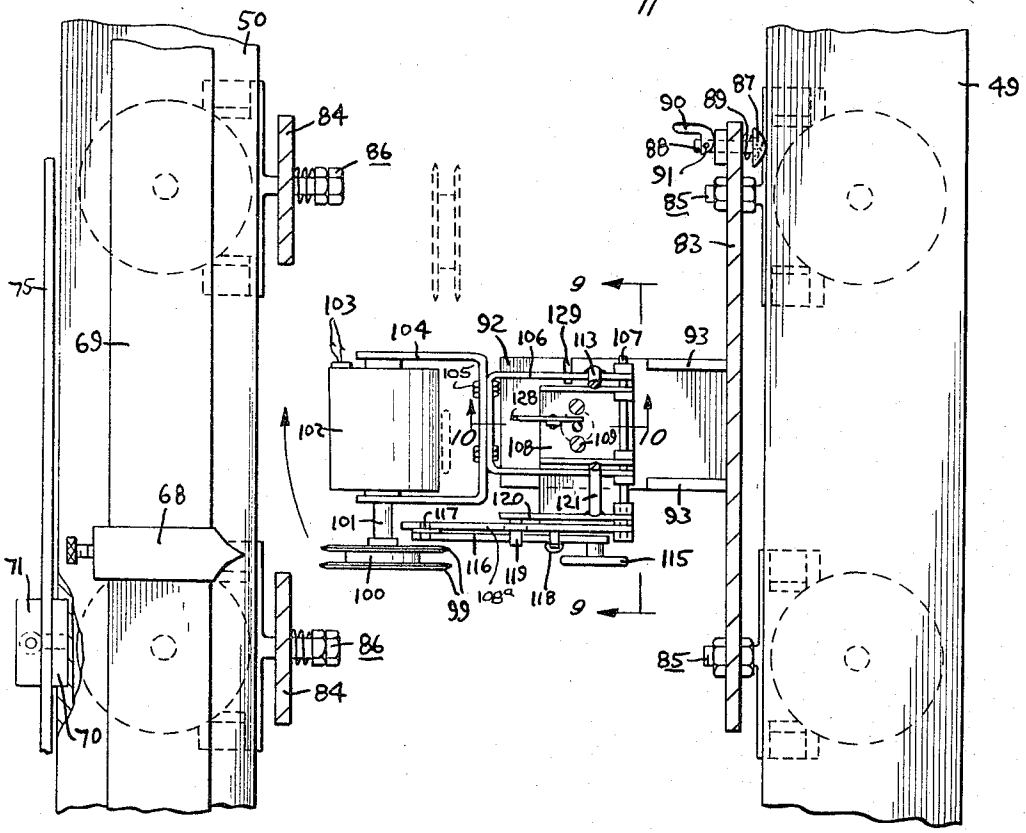


FIG. 8

INVENTOR
CHARLES J. BERGH, JR.

BY Louis Edelson

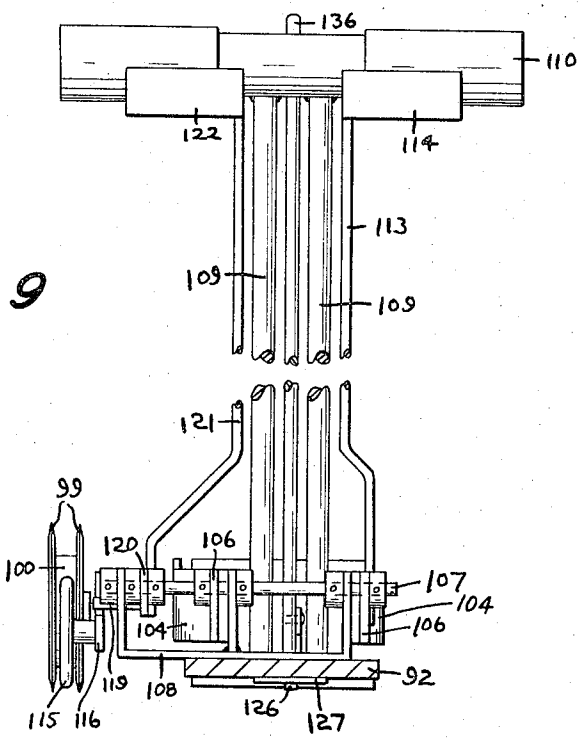
ATTORNEY

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FIG. 9



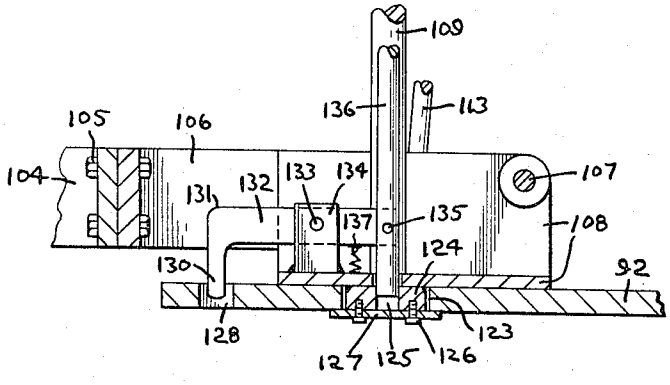


FIG. 10

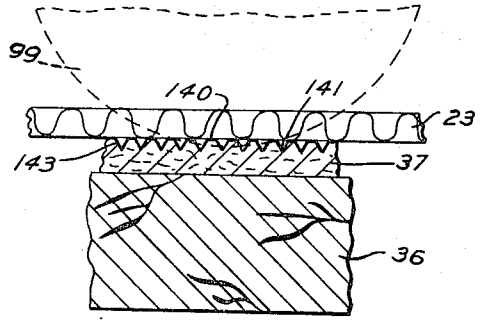


FIG. 11

INVENTOR
CHARLES J. BERGH, JR.
BY Lou Edelson
ATTORNEY

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3,308,723

APPARATUS FOR SLITTING AND SCORING CARTON BLANKS

Charles J. Bergh, Jr., 1208 Old Lancaster Road, Berwyn, Pa. 19312

Filed Aug. 6, 1964, Ser. No. 387,975
20 Claims. (Cl. 93—58)

This invention relates generally to apparatus for slitting and scoring cardboard carton blanks, and more particularly, relates to such apparatus provided with the ability to slit and score such blanks at desired positions along designatable lines so that a carton of a particular size and configuration may be quickly made at the point of use when needed.

In commercial enterprises it is very frequently necessary to package articles of widely varying size and shape in durable containers for shipment, such as those made out of cardboard or corrugated board material. The relatively large variation in size and shape of such articles requires an inventory of a large number of preformed containers of many different sizes and shapes in order that an appropriately sized carton be available when needed. Consequently, capital and space are tied up by the requirement to inventory such containers, or conversely, an excessive amount of time is required to properly package articles in containers which are not suitably proportioned to the article when any attempt is made to reduce the number of different types of packing cartons maintained on hand. The apparatus according to this invention obviates these problems by providing a novel device for slotting and scoring a suitably sized blank to produce a carton of desired size and configuration suitable for accepting a specific article with a minimum of wasted space, the provision of such an apparatus constituting a principal object of this invention.

Another object of this invention is to provide a novel carton blank slotting and scoring apparatus of a portable nature which occupies a relatively small amount of space when set up, and which may be quickly and easily moved from one location to another as the need arises without dismantling the device by virtue of its self-contained configuration.

Still another object of this invention is to provide a novel carton blank slotting and scoring apparatus provided with accurate gauges and indices which show precisely the location and extent of the score lines and slots formed by the apparatus in the carton blank.

A further object of this invention is to provide a novel apparatus as aforesaid which utilizes a fixed platen to which the carton blank is removably securable and a travelling head carried by and shiftable relative to a frame carriage, the travelling head carrying the slotting and scoring devices which are selectively actuatable for operation upon the carton blank, the entire apparatus being relatively inexpensive with respect both to cost and maintenance.

The foregoing and other objects of my invention will appear more fully hereinafter from a reading of the following specification in conjunction with an examination of the appended drawings, wherein:

FIGURE 1 is a front elevational view of the apparatus according to the invention illustrated with a carton blank held on the platen of the apparatus and as having been already slotted and scored;

FIGURE 2 is a plan view on a reduced scale of the scored and slotted carton blank shown mounted on the apparatus of FIGURE 1;

FIGURE 3 is an end elevation of the apparatus as would be seen when viewed along the line 3—3 of FIGURE 1;

FIGURE 4 is an enlarged fragmentary vertical section through a portion of the lower track and roller structure of the apparatus as would be seen when viewed along the line 4—4 of FIGURE 1;

FIGURE 5 is a view similar to that of FIGURE 4 but shown at the upper end of the apparatus of FIGURE 1 as would be seen when viewed along the line 5—5 of the latter;

FIGURE 6 is an enlarged fragmentary view of a portion of the upper track and roller structure of the apparatus as would be viewed along the line 6—6 of FIGURE 5;

FIGURE 7 is an enlarged fragmentary horizontal sectional view taken through the travelling carriage and head of the apparatus which carries the scoring and slotting devices, as would be seen when viewed along the line 7—7 of FIGURE 1;

FIGURE 8 is an enlarged fragmentary plan view of that portion of the apparatus shown in FIGURE 7 as would be viewed along the line 8—8 thereof, and with certain portions of the structure setcioned away to reveal underlying details;

FIGURES 9 and 10 are vertical sectional views taken at right angles to one another with respect to the scoring and slotting actuation devices and head rotation mechanism of the apparatus, as would be seen when viewed respectively along the lines 9—9 and 10—10 of FIGURE 8; and

FIGURE 11 is an enlarged cross-sectional view through that portion of the backing and platen members of the apparatus which is shown within the broken line circle of FIGURE 7.

In the several figures, like elements are denoted by like reference characters.

Turning now to an examination of the figures, consider first FIGURES 1 through 6, and principally FIGURES 1 and 3 for an understanding of the overall organization of the apparatus. From FIGURES 1 and 3 it is observed that the apparatus consists of three main sections which are shiftable relatively to one another, these main sections including a platen carrying stand designated generally as 20, a frame carriage designated generally as 21 which is carried by the stand 20 and shiftable from left to right relatively thereto as indicated in FIGURE 1 by the arrow 21*a*, and a slotting and scoring head designated generally as 22 carried by the carriage 21 and shiftable vertically relatively thereto as indicated by the arrow 22*a*.

As will be seen subsequently, the head 22 carries the slotting and scoring devices which are positionable to slot and score in vertical and horizontal directions, vertical slotting and scoring being achieved by shifting the head 22 longitudinally upward and downward within the carriage 21 while horizontal slotting and scoring are affected by positioning the head 22 at the appropriate point with respect to the carriage 21 and then shifting the entire carriage 21 laterally. In this way, slotting and scoring of a carton blank, such as that designated as 23 in FIGURES 1 and 2, is carried out when the latter is clamped to the stand 20.

The stand 20 is in the form of an easel having a plurality of front support legs 24 and rear support legs 25 which latter are pivotally connected to the stand structure at their upper ends by hinges 26. The front legs 24 and rear legs 25 are intersecured by struts 25A pivotally connected at their fore ends by hinges 26A, and at their rear ends to legs 25 by removable pins 25B. The clamping stand itself comprises a pair of vertically extending opposite end brackets 27 each having top and bottom forwardly extending projections 28 and 29 respectively. Extending horizontally between the top projections 28 of the end brackets 27 and rigidly secured thereto is a top track 30, while a similar bottom track 31 extends hori-

zontally between and is rigidly secured to the bottom projections 29 of the end brackets 27. Each of the top and bottom tracks 30 and 31 is of generally squared C-shape in cross-section with the open portion of the C-shaped cross-section defining a longitudinally extending slot on the underside of the top track 30 while the similar slot of the bottom track 31 is positioned at the upper surface thereof.

Extending parallel to the top track 30 and fixedly secured to the front face thereof, as for example by welding, is a T-shaped bar 32 extending the full length of the top track and carrying thereon a plurality of movable indices 33 each of which has a downwardly projecting finger 34 and which is lockable to the bar 32 by means of a thumb screw 35 threadedly passing through the upper edge of the indices 33 and into abutting relationship with the top of the bar 32. Also fixedly secured to and carried by the end brackets is the rigid rectangular backing board 36 covered by the congruent overlying platen 37 secured flatwise upon the latter.

Secured to the upper edge of the backing board 36 and extending downward therebehind are a plurality of angled brackets 38 upon the upper surface of which are fixed the trunnion supports 39 which pivotally carry by means of shafts 40 an L-shaped clamp bar 41. The clamp bar 41 is positioned above the backing board and platen with the forward edge of the clamp bar projecting downward in front of and below the upper edge of the platen 37, the clamp bar 41 extending substantially horizontally for the full length of the stand. Disposed between the trunnion supports 39 and the clamp bar 41 are compression springs 42 which press upward on the horizontal leg of the clamp bar to cause the depending forward edge of the latter to be biased inward against the platen 37 when the apparatus is not in use.

Secured to the rear end of the clamp bar 41 and extending downward therefrom behind the backing board 36 is a cable 43 which has its lower end secured to a bracket 44 carried by a front-to-rear extending pedal 45 pivotally secured as at 46 at its rear end to one of the rear support legs 25. Depression of the pedal 45 causes the cable 43 to be pulled downward to thereby pivot the clamp bar 41 about the shaft 40 against the bias of the compression springs 42 and thereby move the downwardly extending leg of the clamp bar 41 forward away from engagement with the platen 37 so that the upper edge of a carton blank 23 may be slipped behind the clamp bar between the latter and platen 37. Release of the pedal 45 allows the compression springs 42 to rotate the clamp bar downwardly projecting front leg rearward and clamp the carton blank 23 against the platen 37.

The carriage 21 is in the form of a rectangular frame having spaced apart parallel top and bottom members 47 and 48 respectively, and a pair of parallel spaced apart side members 49 and 50 all rigidly intersecured at the carriage corners. In considering the carriage structure, reference should additionally be made to the showings of FIGURES 7 and 8 for certain of the details which are seen most clearly therein. The carriage top and bottom members 47 and 48 are of hollow square cross-section (as see the member 47 in FIGURE 5), while the carriage side members 49 and 50 are track sections of the same squared C-shaped cross-section as the top and bottom tracks 30 and 31 of the stand 20, this being best illustrated in the showings of FIGURES 7 and 8.

As best seen in FIGURES 5 and 6, the carriage top member 47 has fixedly secured thereto at each of its corners a two-wheeled trolley structure designated generally as 51. The trolleys 51 each include a main central frame 52 of generally T-shaped configuration the depending leg of which is threaded at its lower end and secured to the carriage top member 47 by means of nuts 53. The headed upper end of the trolley frame is provided with a bore extending at right angles to the plane of the carriage 21 and having projected therethrough a shaft 54

upon the opposite ends of which are secured a pair of wheels or discs 55.

The trolley 51 is so proportioned relatively to the top track 30 of the stand 20 that the wheels 55 ride on the tracks 56 formed by the facing inwardly upturned arms of the squared C-shaped frame top track with the trolley frame 52 projecting downward through the longitudinally extending slot between the tracks 56. The trolley frame 52 is fitted at its fore and aft ends with cylindrical guide rollers 57 rotatable about vertically extending plates 58 so that the vertically positioned fore and aft rollers both lie within the slot between the tracks 56 of the top track section 30 of frame 20, the diameter of the rollers being somewhat less than the slot width to insure rolling rather than skidding contact between the guide rollers and edges of tracks 56.

As best seen in FIGURE 4, each of the carriage side members 49–50 is provided at its lower end with a trolley 59 of exactly the same type as has just been described in connection with FIGURES 5 and 6 in which the trolley illustrated therein was designated as 51. The lower end trolleys 59, however, while being the same as the trolleys 51, are secured to the carriage members in a spring loaded resilient manner rather than by means of a fixed and rigid connection. Thus, it will be observed that the threaded ends of the trolley frames are respectively projected upward through apertures in the lower ends of the carriage side member 49–50, each having threaded upon its end a pair of nuts 60 with a compression spring 61 disposed about the trolley frame threaded end between the nuts 60 and the bottom of the carriage side member. Consequently, the bottom trolley structures 59 are each biased upward by the compression springs 61 to thereby maintain the wheels 62 in firm and rolling engagement with the tracks 63 of the bottom track 31.

The spring loading of these lower trolleys 59 accommodates for any minor variation which might occur in the spacing between the top and bottom tracks 30 and 31 of the stand 20. From the foregoing description it will become clear that the carriage 21 is enabled to roll freely and easily laterally across the face of the stand 20 to thereby enable it to carry the slotting and scoring head 22 in a horizontal direction with respect to any carton blank which may be clamped to the stand 20 by means of the clamp bar 41.

Fixed upon the outer surface of the carriage top member 47 are a slotting index 64 and a scoring index 65 which exactly indicate the respective positions of the slotting device and scoring device of the head 22 when the latter is positioned for slotting and scoring in a horizontal direction. By this means, motion of the carriage 21 may be stopped when the appropriate index 64 or 65 comes into vertical alignment with a particularly positioned one of the movable indices 33 adjustably positionable on the T bar 32 of the stand 20, and it will then be known that the slotting or scoring has been carried exactly up to a point in vertical alinement with such particularly positioned index 33.

Similarly, another pair of slotting and scoring indices designated respectively as 66 and 67 are fixedly secured to the head carriage 22 for use in conjunction with movable indices 68 slidable vertically longitudinally along a T bar 69 extending longitudinally of and fixedly secured to the upper surface of the carriage side member 50, to thereby provide for exact determination of the extent of slotting or scoring effected by vertical motion of the head 22 within the track structure of the carriage 21, all as will be described subsequently herein.

The carriage 21 is fitted with an auxiliary carton blank clamping structure carried by the carriage side member 50 and selectively operable as desired. Details of the auxiliary clamping structure are best seen in the showings of FIGURES 1, 3, 7 and 8 to which particular reference should be now made. The auxiliary clamping structure includes a plurality of flat clamping bars 70

each provided at its bottom end with a clamping point 71, the clamping bars 70 being disposed within complementally formed slots 72 cut into the left side edge of the carriage side member 50 so that the clamping bars 70 are shiftable orthogonally toward and away from the platen 37 of the stand 20. Each of the clamping bars 70 is also provided with a diagonal slot 73 within which is disposed one end of a pin 74 which has its opposite end rigidly secured to a bar 75 which extends longitudinally in parallel relation alongside the carriage side member 50. The bar 75 is adapted for longitudinal shifting movement with respect to the carriage side member 50 and is captively movably secured to the latter by the pins 76 projected through slots 77 in the bar 75 at opposite ends of the latter, with the pins 76 being fixed to the carriage side member 50.

The bar 75 is also fitted with an outwardly projecting pin 78 located approximately at the center of the bar and extending outward through a slot 79 formed in a crank 80 illustrated as extending orthogonally to the length of the bar 75, the bottom of the crank 80 being pivotally secured as at 81 to the carriage side member 50. The crank 80 is shiftable as indicated by the arrow 81*a* seen in the showing of FIGURE 3, clockwise rotation of the crank 80 causing the clamping bars 70 to move downward within their slots 72 to clamp the carton blank 23 to the underlying platen 37 while counterclockwise rotation of the crank 80 drives the clamping bars 70 upward in their slots 72 and disengages the clamping bar points 71 from the underlying carton blank 23. This auxiliary clamping system is of course usable only when the carriage 21 is to be locked in position to carry out the vertical slotting or scoring by shifting motion of the head 22.

Referring now particularly to FIGURES 1, 7 and 8 for details of the slotting and scoring head 22, it is observed that the slotting and scoring head consists of a carriage mount portion which supports and carries the slotting and scoring devices. The carriage mount is formed by the top plate 82 which has a downwardly turned right hand wall 83 and a pair of downturned left hand legs 84. The top plate wall 83 has rigidly secured thereto at opposite ends thereof a pair of trolleys 85 of the same type as the trolleys 51 previously described in connection with the description of the carriage 21, while the top plate legs 84 are each fitting with spring loaded trolleys 86 of the same kind as the trolleys 59 also previously described in connection with the carriage 21. The trolleys 85 and 86 ride within the carriage side members 49 and 50 respectively in the same manner as the trolleys 51 and 59 ride within the tracks 30 and 31 of the stand 20.

As seen in FIGURE 8 at the upper end of the top plate side wall 83, a pressure pad 87 carried on a shaft 88, which latter is projected through an aperture in the wall 83, is biased by compression spring 89 into engagement with the carriage side member 49 to thus lock the head 22 to the carriage 21 when it is desired to do horizontal slotting or scoring in order to insure that the head 22 does not ride vertically up or down while the carriage 21 is shifting. The pressure pad 87 is retractable from engagement with the carriage side member 49 to release the head 22 by rotating the cam 90 clockwise about its pivot connection 91 to the shaft 88 to thereby draw the shaft inward against the bias of compression spring 89 and disengage the pressure pad. The mount portion of the head 22 which supports the slotting and scoring devices is completed by the horizontally extending base support plate 92 which is rigidly secured to the top plate side wall 83 by the gusset plates 93.

As best seen in FIGURES 1 and 6, the carriage 21 is provided with a pair of spring retractor cable reels 94 out of which extend cables 95 which latter have their ends secured to opposite sides of the head 22 at the upper end thereof and which bias the head upward toward the top of the stand. The tension in the cables 95 is proportioned to compensate for the mass of the head 22 to thereby render movement of the head 22 within the carriage 21 a matter of very little effort. A cable reel 96 is fixedly mounted to the center front support leg 24 of the stand 20 and has extending therefrom an electrical cable 97 which passes into the lower end of the head 22 after passing between a pair of guide pulleys 98 mounted upon the carriage bottom member 48, the cable 97 being utilized to carry current to the slotting apparatus as will be described.

Considering now the slotting and scoring portions of the head 22, particular reference should be made to FIGURES 7 through 10. As best seen in FIGURES 7 and 8, the slotter is formed by a pair of disc knives 99 spaced apart by a cylindrical spacer 100 of smaller diameter than the knives 99, with this entire assembly fixedly secured upon the end of shaft 101 of an electrical motor 102. The motor 102 is selectively energizable from an appropriate source of electric power through conductors 103 which connect to cable 97 and a switch, not shown, which latter may be carried at an appropriate point by the head 22. The motor 102 is fixedly carried by a U-shaped bracket 104 which latter has its base portion rigidly secured as by means of nuts and bolts 105 to the base of another U-shaped bracket 106, the terminal ends of the arms of such U-shaped bracket 106 being pivotally secured upon a shaft 107 which is horizontally carried by the upwardly extending ends of the arms of a U-shaped mount 108 having its base disposed flatwise upon the upper surface of base plate 92.

Fixedly secured ot the base of the U-shaped mount 108 and extending vertically upward therefrom are a pair of spaced apart parallel bars 109 rigidly coupled to one another at their upper ends by means of the transversely extending tubular cross-piece 110 which together with the rods 109 forms a T-shaped handle. Affixed to the rods 109 and extending laterally therefrom beneath the top plate 82 is a support arm 111. Extension spring 112 is secured between the arm 111 and the base of the motor-supporting U-shaped bracket 104 so that the entire slotting apparatus is biased upward normally out of contact with any carton blank 23 which may be disposed thereunder, in the manner best seen in the showing of FIGURE 7.

Rigidly connected to and extending upward from one arm of the U-shaped bracket 106 is a shaft 113 provided at its upper end with an outwardly laterally extending finger piece 114, the shaft 113 being disposed at an angle to the vertically extending handle rods 109 and terminating at a point below the handle crosspiece 110. Thus, as best seen from FIGURE 7 and FIGURE 9, pressure exerted on the finger piece 114 in such direction as to rotate the shaft 113 toward the handle overcomes the upward bias of spring 112 and moves the slotting discs downward into engagement with the underlying carton blank to thereby slot the same. Movement of the head 22 and/or carriage 21 moves the slotting disc knives 99 a comparable distance and cuts a slot through the carton blank, this action being terminated by releasing the finger piece 114 to again allow the spring 112 to disengage the slotting knives from the catron blank by pivoting the entire slotting structure upward about pivot shaft 107.

The scoring wheel 115 is rotatably secured upon one end of arm 116, the opposite end of which is pivotally connected, as at 117, to an extension 108*a* of the lower arm of U-shaped mount 108 as viewed in FIGURE 8, or, which is the same thing, the left had arm of U-shaped mount 108 as seen in FIGURE 9. Secured between the arm 116 and the arm of mount 108 to which the latter is pivotally secured is a spring 118 which biasses the arm 116 and scoring wheel 115 upward out of contact with the underlying container blank. The upward retraction of arm 116 is terminated by engagement with the under surface of pin 119 which is shiftable vertically within limits in a slot through the U-shaped mount arm

108, the pin 119 being affixed to the end of crank arm 120, the opposite end of which crank arm is pivoted upon shaft 107.

Rigidly affixed to the crank arm 120 and extending upward therefrom is shaft 121 which has secured to its upper end an outwardly turned lateral finger pieces 122, shaft 121 being substantially parallel to previously described rockable shaft 113, the shafts 113 and 121 being respectively disposed at opposite sides of the T-shaped handle 110 with their finger pieces 114 and 122 each in relatively close proximity to oppositely extending ends of the handle. Scoring wheel 115 is depressed to engage an score an underlying carton blank by movement of shaft 121 toward the handle to thereby pivot arm 120 downward and cause pin 119 to bear against the upper edge of arm 116 so that the latter pivots about 117 and depresses the scoring wheel 115 against the bias of spring 118. Scoring will of course continue with motion of the head 22 or carriage 21 until scoring wheel 115 is disengaged from the carton blank by releasing finger piece 122 to thereby allow the spring 118 to retract the scoring wheel upward.

Referring to FIGURES 1, 7 and 8, it will be appreciated that the head 22 is positioned so that the slotting disc knives 99 and scoring wheel 115 are oriented for slotting and scoring in a horizontal direction as seen in FIGURE 1 by locking the head 22 to the carriage 21 and shifting the carriage 21 laterally as required. With the slotting and scoring devices in the positions illustrated it is not possible to either slot or score in a vertical direction, and accordingly, it is necessary to provide means for rotating the slotting and scoring devices through ninety degrees to their illustrated orientation in order to make it possible to move the head vertically with respect to the carriage 21. The rotated positions of the slotting and scoring devices is illustrated in FIGURE 8 in dashed outline, and the means for effecting such rotation is most clearly seen from the showings of FIGURES 8 and 10.

As best seen in FIGURE 10, the base plate 92 is provided with a circular aperture 123 therethrough within which is close fittingly disposed a circular disc 124 which is itself centrally vertically apertured as at 125. The upper surface of disc 124 is rigidly secured, as by welds 124*a*, to the undersurface of the base of U-shaped mount 108 while the undersurface of disc 124 has secured thereto, as by means of machine screws 126, a retension plate 127 of diameter greater than aperture 123 in the base plate 92. The mount 108 which carries the entire slotting and scoring structure is therefore pivotally secured to the base plate 92 and may be freely rotated relatively thereto by turning the T-shaped handle structure. Since two specifically positioned orthogonally related orientations of the slotting and scoring devices is desired, it is necessary to provide a detenting mechanism to assure that the slotting and scoring devices assume either a vertical or a horizontal alignment and not some other position intermediate.

The detenting structure includes a pair of slots 128 and 129 cut vertically through the base plate 92 and which may both be seen in the showing of FIGURE 8. As best seen in FIGURE 10, the slot 128 has disposed therein the downwardly projecting finger 130 of the L-shaped detent 131, the upper horizontal arm 132 of the detent being pivotally supported as at 133 at approximately its midpoint by an upstanding plate 134 which is rigidly secured at its lower end to the upper surface of mount 108. The free end of horizontal arm 132 of detent 131 is pivotally secured, as at 135, just above the lower end of vertically extending rod 136, the lower end of rod 136 passing freely downward into the aperture 125 of base plate 92 but terminating at a point substantially above the bottom thereof. Rod 136 extends vertically upward between the handle rod 109 and extends freely through a vertically extending hole in the cross piece 110 so that a portion of the rod 136 projects above the cross piece 110.

When it is desired to rotate the slotting and scoring devices from one position to the other, the upper end of rod 136 is depressed so that the entire rod moves downward and thus causes the dentent 131 to pivot about supporting pivot 133 and lift the depending finger 130 out of whichever of the slots 128 and 129 it is located to thereby permit the slotting and scoring support to be rotated by means of the handle structure to the desired orthogonally located position. Latching engagement is reestablished by merely releasing the rod 136 so that compression spring 137 disposed between mount 108 and the horizontal arm 132 of the detent 131 shifts the rod 136 upward and drives the detent finger 130 downward into the appropriate slot 128 or 129.

Returning now to FIGURE 2 which illustrates a typically scored and slotted carton blank 23, it will be appreciated that the vertically extending upper slots 138 cannot be brought to the edge of the carton blank by virtue of the fact that the upper marginal edge of the blank is clamped beneath the L-shaped clamp bar 41 in the manner best illustrated in FIGURE 5. This marginal edge is shown in phantom in FIGURE 2 and designated as 139. When the blank 23 has been completely slotted and scored, this upper marginal edge 139 is cut away by running the carriage 21 horizontally and employing the slotting wheel to cut the blank across its full length along a line coincident with the upper ends of the previously cut slots 138. The blank 23 is of course laid out to take into account the fact that this upper marginal edge 139 is to be removed.

While the platen 37 upon which the carton blank is placed may be formed of any suitable material which will permit proper cutting penetration of the slitting knives 99 through the blank, it has been found that superior cutting results are obtained with use of a platen 37 made of hard-board or the like having a surface for supporting the carton blank which is formed, as shown in FIGURE 11, throughout its area over which the slitting operation is performed with closely spaced depressions or indentations to provide an undulating line of alternately spaced crests 140 and depressions 141 coincident with the line of travel of the slitting knives. Such indentations are usually present in and characterise what is normally considered to be the unfinished or screened surface of hard-board.

By coating such indented surface with an anti blocking substance, such as silicone gel, (e.g. "Slipicone" manufactured by Dow Corning Corporation, Midland, Mich.), powdered talc or powdered mica, to provide the same with a surface film 143 having a low coefficient of friction, the slitting knives are enabled to cut through the overlying blank with minimum effort not only by the motor which drives the cutting discs but also by the operator in moving the cutting head along the desired lines of cut. This reduced effort is achieved by virtue of the fact that as the cutting blades traverse the line of cut and penetrate the carton blank just sufficiently to contact the underlying lubricated surface of the blank-supporting platen, the cutting discs move through the successive crests along the line of cut and so encounter minimum resistance to their cutting action with resultant cleaner cuts through the blank and longer operating life of the slitting knives and of the underlying platen.

Having now described my invention in connection with a particularly illustrated embodiment thereof it will be appreciated that modifications and variations of my invention may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of my invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed to be new and useful is:

1. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage.

2. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means mounting said slotting and scoring devices in said head in colinear relationship so that slotting and scoring may be carried out along different parts of the same line by selective operation of said devices.

3. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device comprising circular disc slotting means rotatable about an axis parallel to and above the plane of said platen, selectively energizable drive means for driving said shaft to rotate said knives, a shiftable frame carrying said drive means and slotting means, biasing means coupled to said frame effective to bias the slotting means upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said slotting means toward said platen to thereby slot a carton blank carried thereby

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage.

4. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device comprising, a circular scoring wheel rotatably mounted upon a shiftable support with the plane of said wheel perpendicular to the plane of said platen, biasing means coupled to said shiftable support effective to bias the scoring wheel upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said scoring wheel toward said platen to thereby score the carton blank carried thereby when said scoring wheel is moved relative to said carton blank,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage.

5. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a base member secured to roller supports which latter are rollingly carried by said carriage to provide said right angled movement of said head relative to said carriage path,

(2) a slotting device carried by said base member and means for selectively operating the same,

(3) a scoring device carried by said base member and means for selectively operating the same,

(4) means coupled to said slotting and scoring devices for selectively positioning the same for operation along lines parallel to the lines of motion of said head and carriage.

6. The apparatus as set forth in claim 5 wherein said slotting and scoring devices are carried by a common mount which latter is in turn rotatably carried by said base member, and wherein said last named means includes releasable detent means partly associated with said common mount and partly associated with said base member and an operator for rotating said mount from one detented position to another.

7. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said

slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage,

(d) a plurality of indicators carried by said head and carriage and stand showing the exact lines and points of slotting and scoring for said slotting and scoring devices.

8. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a base member secured to roller supports which latter are rollingly carried by said carriage to provide said right angled movement of said head relative to said carriage path,

(2) slotting device carried by said base member comprising circular disc slotting means rotatable about an axis parallel to and above the plane of said platen, selectively energizable drive means for driving said shaft to rotate said slotting means, a shiftable frame carrying said drive means and slotting means, biasing means coupled to said frame effective to bias the slotting means upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said slotting means toward said platen to thereby slot a carton blank carried thereby,

(3) a scoring device carried by said base member and means for selectively operating the same,

(4) means coupled to said slotting and scoring devices for selectively positioning the same for operation along lines parallel to the lines of motion of said head and carriage.

9. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a base member secured to roller supports which latter are rollingly carried by said carriage to provide said right angled movement of said head relative to said carriage path,

(2) a slotting device carried by said base member and means for selectively operating the same,

(3) a scoring device carried by said base member comprising, a circular scoring wheel rotatably mounted upon a shiftable support with the plane of said wheel perpendicular to the plane of said platen, biasing means coupled to said shiftable support effective to bias the scoring wheel upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said scoring wheel toward said platen to thereby score the carton blank carried thereby when said scoring wheel is moved relative to said carton blank,

(4) means coupled to said slotting and scoring devices for selectively positioning the same for operation along lines parallel to the lines of motion of said head and carriage.

10. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage caried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a base member secured to roller supports which latter are rollingly carried by said carriage to provide said right angled movement of said head relative to said carriage path,

(2) a slotting device carried by said base member comprising, circular disc slotting means rotatable about an axis parallel to and above the plane of said platen, selectively energizable drive means for driving said shaft to rotate said slotting means, a shiftable frame carrying said drive means and slotting means, biasing means coupled to said frame effective to bias the slotting means upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said slotting means toward said platen to thereby slot a carton blank carried thereby,

(3) a scoring device carried by said base member comprising, a circular scoring wheel rotatably mounted upon a shiftable support with the plane of said wheel perpendicular to the plane of said platen, biasing means coupled to said shiftable support effective to bias the scoring wheel upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said scoring wheel toward said platen to thereby score the carton blank carried thereby when said scoring wheel is moved relative to said carton blank,

(4) means coupled to said slotting and scoring devices for selectively positioning the same for operation along lines parallel to the lines of motion of said head and carriage.

11. The apparatus as set forth in claim 10 wherein said slotting and scoring devices are carried by a common mount which latter is in turn rotatably carried by said base member, and wherein said last named means includes releasable detent means partly associated with said common mount and partly associated with said base member and an operator for rotating said mount from one detented position to another.

12. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(3) horizontally parallel extending top and bottom tracks spaced respectively higher and lower than the horizontally extending upper and lower edges of said platen,

(b) a carriage rollably carried by said top and bottom tracks of said stand and rectilinearly horizontally shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage

for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage.

13. A catron blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(3) horizontally parallel extending top and bottom tracks spaced respectively higher and lower than the horizontally extending upper and lower edges of said platen,

(b) a carriage rollably carried by said top and bottom tracks of said stand and rectilinearly horizontally shiftable with respect to said platen, said carriage including a pair of vertically parallel extending spaced apart side tracks extending upward above the upper edge of said platen and downward below the lower edge of said platen,

(c) a slotting and scoring head rollably carried by said carriage side tracks and rectilinearly vertically shiftable at right angles to the horizontal path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage.

14. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage,

(d) selectively operable means effective when operated to lock said carriage against further movement with respect to said platen.

15. A carton blank slotting and scoring apparatus comprising in combination,

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage,

(d) selectively operable means effective when operated to lock said head against movement with respect to said carriage.

16. A carton blank slotting and scoring apparatus comprising in combination

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(3) horizontally parallel extending top and bottom tracks spaced respectively higher and lower than the horizontally extending upper and lower edges of said platen,

(b) a carriage rollably carried by said top and bottom tracks of said stand and rectilinearly horizontally shiftable with respect to said platen, said carriage including a pair of vertically parallel extending spaced apart side tracks extending upward above the upper edge of said platen and downward below the lower edge of said platen,

(c) a slotting and scoring head rollably carried by said carriage side tracks and rectilinearly vertically shiftable at right angles to the horizontal path of carriage motion, said head including,

(1) a base member secured to roller supports which latter are rollingly carried by said carriage to provide said right angled movement of said head relative to said carriage path,

(2) a slotting device carried by said base member comprising, a pair of identical parallel spaced apart circular disc slotting knives rotatable about their circular axes on a common shaft positioned parallel to and above the plane of said platen, selectively energizable drive means for driving said shaft to rotate said knives, a shiftable frame carrying said drive means and slotting knives, biasing means coupled to said frame effective to bias the slotting knives upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said slotting knives toward said platen to thereby slot a carton blank carried thereby,

(3) a scoring device carried by said base member comprising, a circular scoring wheel rotatably mounted upon a shiftable support with the plane of said wheel perpendicular to the plane of said platen, biasing means coupled to said shiftable support effective to bias the scoring wheel upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said scoring wheel toward said platen to thereby score the carton blank carried thereby when said scoring wheel is moved relative to said carton blank,

(4) means coupled to said slotting and scoring devices for selectively positioning the same for operation along lines parallel to the lines of motion of said head and carriage.

17. A carton blank slotting and scoring apparatus comprising in combination

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed,

(2) means for removably fixedly clamping a carton blank to said platen,

(3) horizontally parallel extending top and bottom tracks spaced respectively higher and lower than the horizontally extending upper and lower edges of said platen,

(b) a carriage rollably carried by said top and bottom tracks of said stand and rectilinearly horizontally shiftable with respect to said platen, said carriage including a pair of vertically parallel extending spaced apart side tracks extending upward above the upper edge of said platen and downward below the lower edge of said platen,

(c) a slotting and scoring head rollably carried by said carriage side tracks and rectilinearly vertically shiftable at right angles to the horizontal path of carriage motion, said head including,

(1) a base member secured to roller supports which latter are rollingly carried by said carriage to provide said right angled movement of said head relative to said carriage path,

(2) a slotting device carried by said base member comprising, a pair of identical parallel spaced apart circular disc slotting knives rotatable about their circular axes on a common shaft positioned parallel to and above the plane of said platen, selectively energizable drive means for driving said shaft to rotate said knives, a shiftable frame carrying said drive means and slotting knives, biasing means coupled to said frame effective to bias the slotting knives upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said slotting knives toward said platen to thereby slot a carton blank carried thereby,

(3) a scoring device carried by said base member comprising, a circular scoring wheel rotatably mounted upon a shiftable support with the plane of said wheel perpendicular to the plane of said platen, biasing means coupled to said shiftable support effective to bias the scoring wheel upward away from said platen out of contact with any carton blank clamped thereto, and selectively operable means effective when operated to overcome said biasing means and shift said scoring wheel toward said platen to thereby score the carton blank carried thereby when said scoring wheel is moved relative to said carton blank,

(4) means coupled to said slotting and scoring devices for selectively positioning the same for

operation along lines parallel to the lines of motion of said head and carriage,

(d) selectively operable means effective when operated to lock said carriage against further movement with respect to said platen,

(e) selectively operable means effective when operated to lock said head against movement with respect to said carriage.

18. The apparatus as set forth in claim **17** wherein said slotting and scoring devices are carried by a common mount which latter is in turn rotatably carried by said base member, and wherein said last named means includes releasable detent means partly associated with said common mount and partly associated with said base member and an operator for rotating said mount from one detented position to another.

19. A carton blank slotting and scoring apparatus comprising in combination.

(a) a stand including

(1) a platen upon which a carton blank may be flatwise disposed, said platen being formed with closely spaced indentations through the area of its surface immediately underlying the carton blank to provide undulating lines of alternately spaced crests and depressions coincident with the lines of travel of the slotting device hereinafter referred to,

(2) means for removably fixedly clamping a carton blank to said platen,

(b) a carriage carried by said stand and rectilinearly shiftable with respect to said platen,

(c) a slotting and scoring head carried by said carriage for movement at right angles to the path of carriage motion, said head including,

(1) a slotting device and means for selectively operating the same,

(2) a scoring device and means for selectively operating the same,

(3) means for selectively positioning each of said slotting and scoring devices for operation along lines parallel to the lines of motion of said head and carriage.

20. An apparatus as defined in claim **19** wherein said indented surface of the platen is coated with an antiblocking substance to provide the same with a surface film having a low coefficient of friction.

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BERNARD STICKNEY, *Primary Examiner.*