March 19, 1929. G. W. SWIFT, JR 1,706,366

BOX BLANK TRIMMING MACHINE

Filed April 9, 1926 6 Sheets-Sheet 1

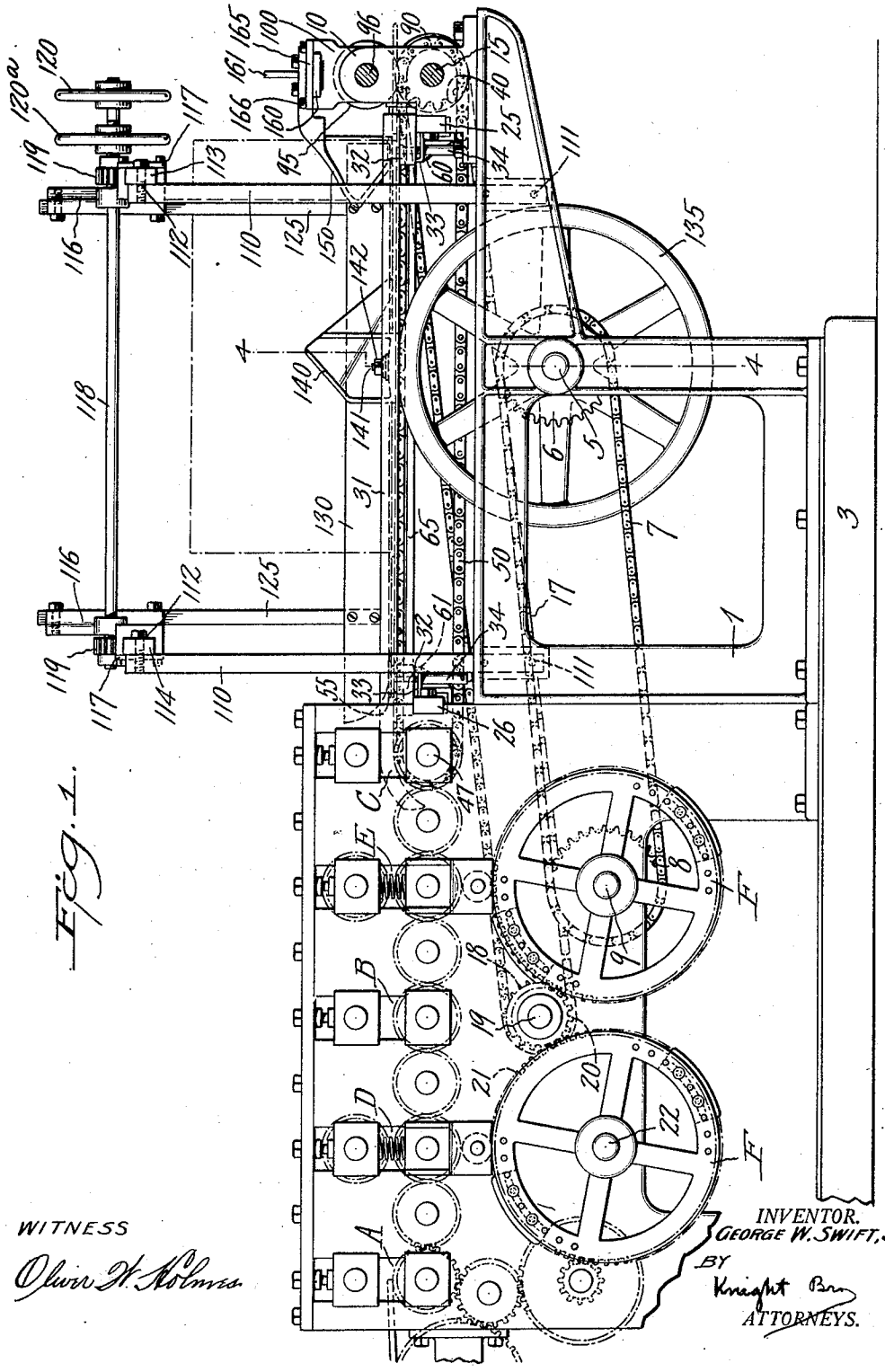


Fig. 1.

WITNESS

Oliver W. Holmes

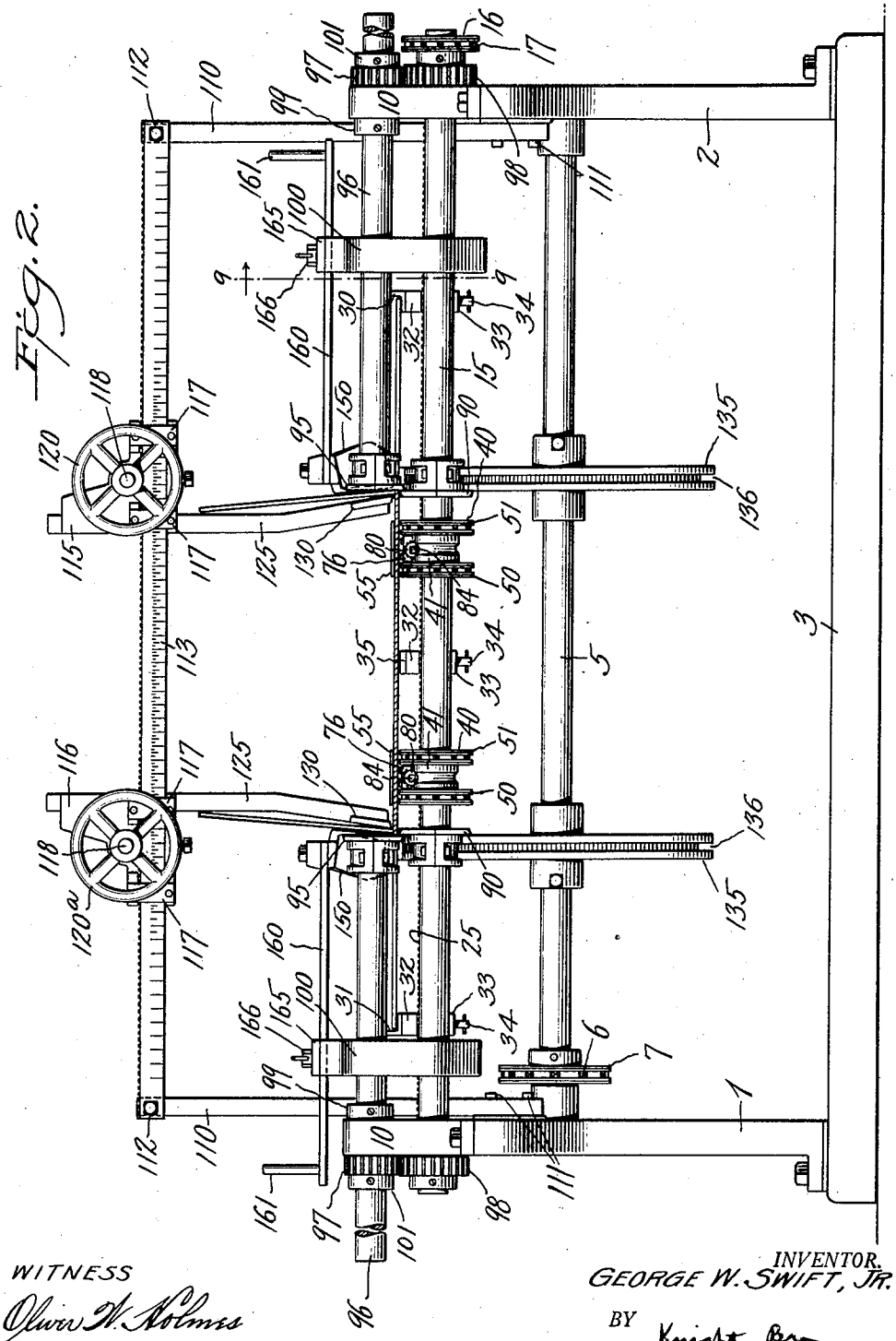
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BOX BLANK TRIMMING MACHINE

Filed April 9, 1926 6 Sheets-Sheet 2

Fig. 2.



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BOX BLANK TRIMMING MACHINE

Filed April 9, 1926 6 Sheets-Sheet 3

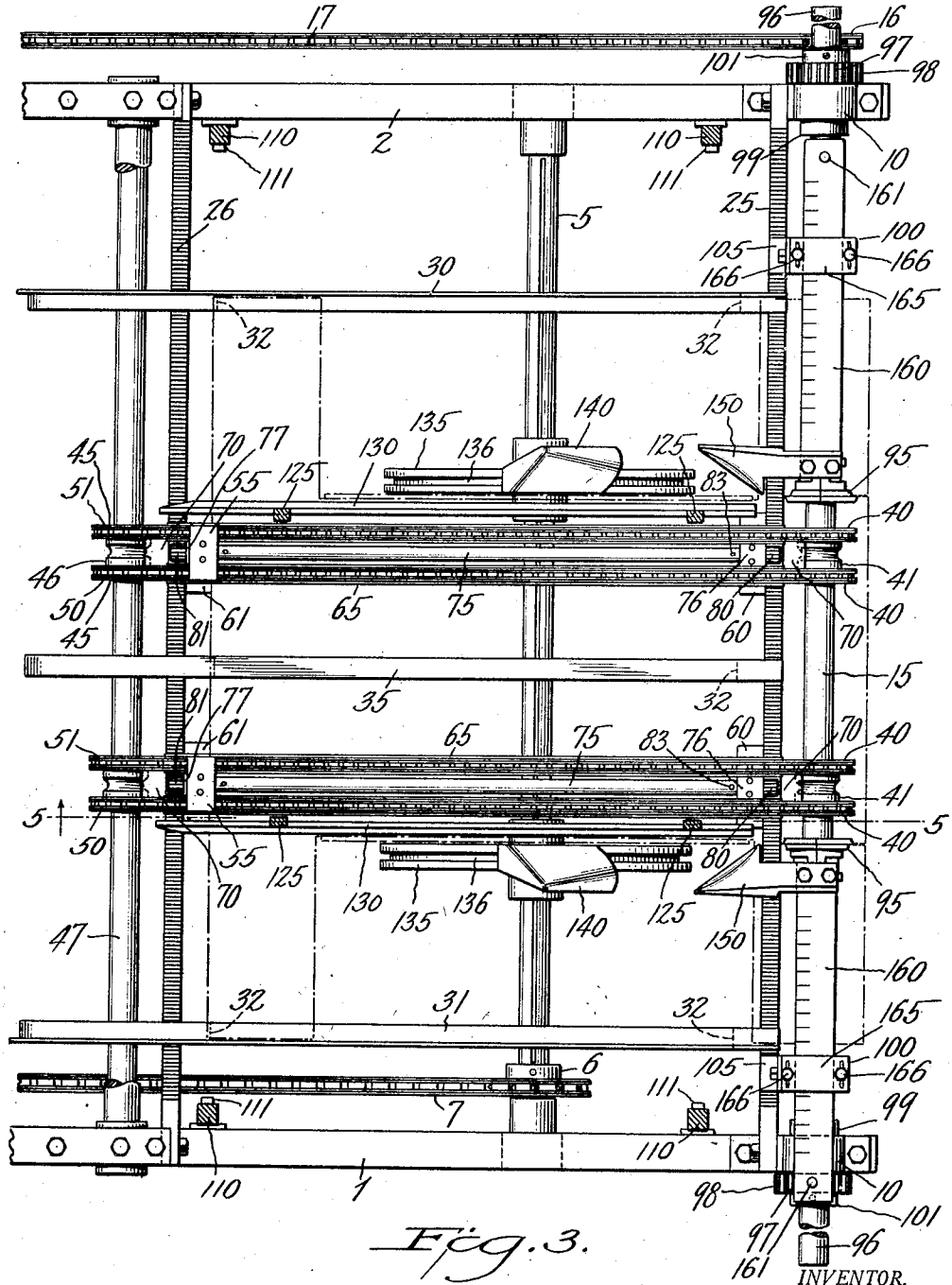


Fig. 3.

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BOX BLANK TRIMMING MACHINE

Filed April 9, 1926 6 Sheets-Sheet 4

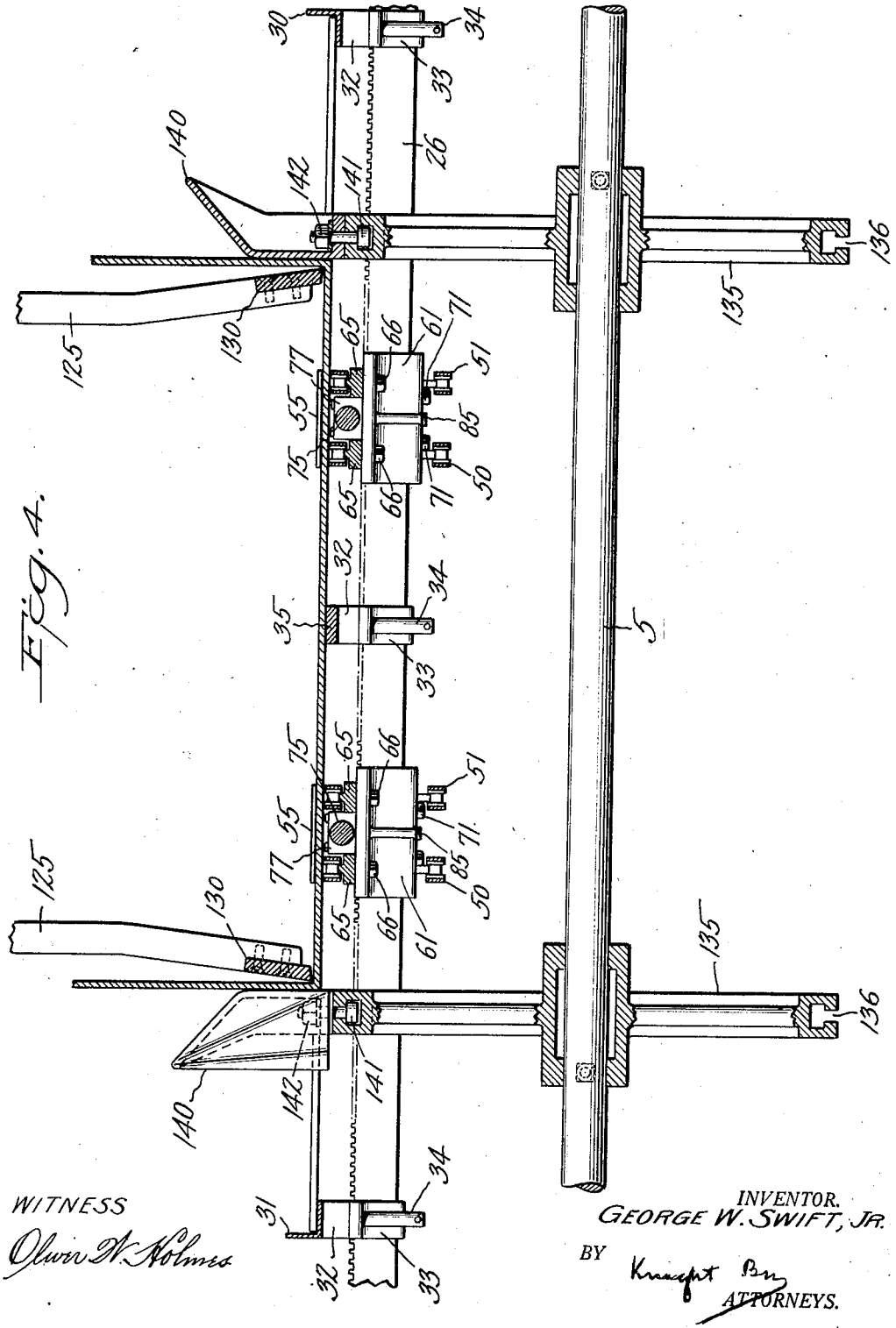


Fig. 4.

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BOX BLANK TRIMMING MACHINE

Filed April 9, 1926 6 Sheets-Sheet 5

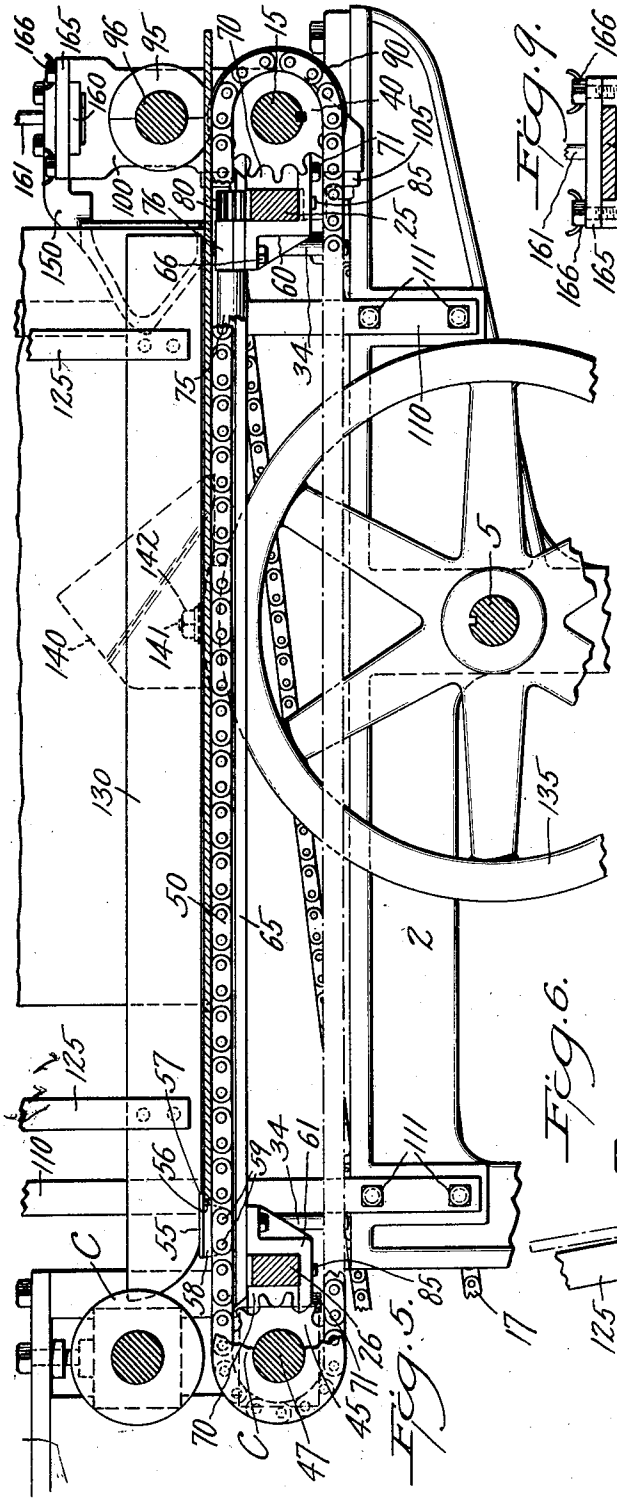


Fig. 5.

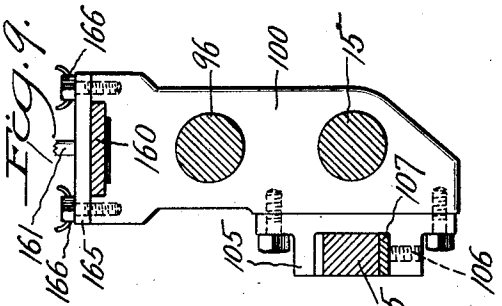


Fig. 9.

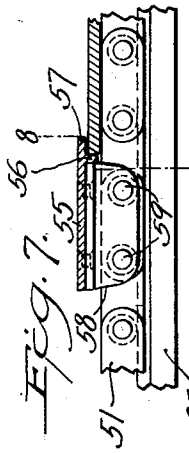


Fig. 7.

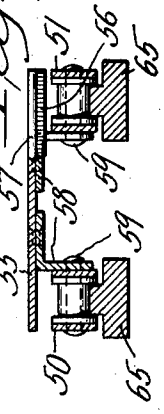


Fig. 8.

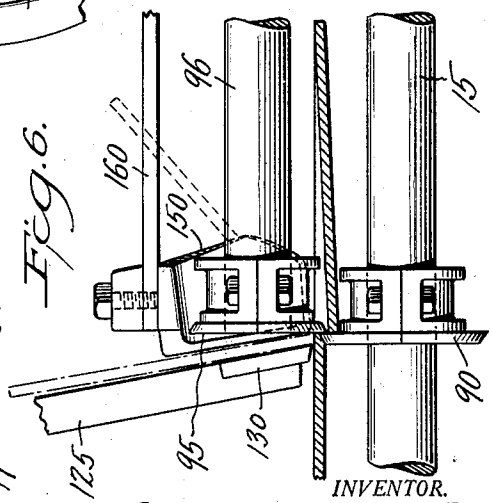


Fig. 6.

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BOX BLANK TRIMMING MACHINE

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Fig. 10.

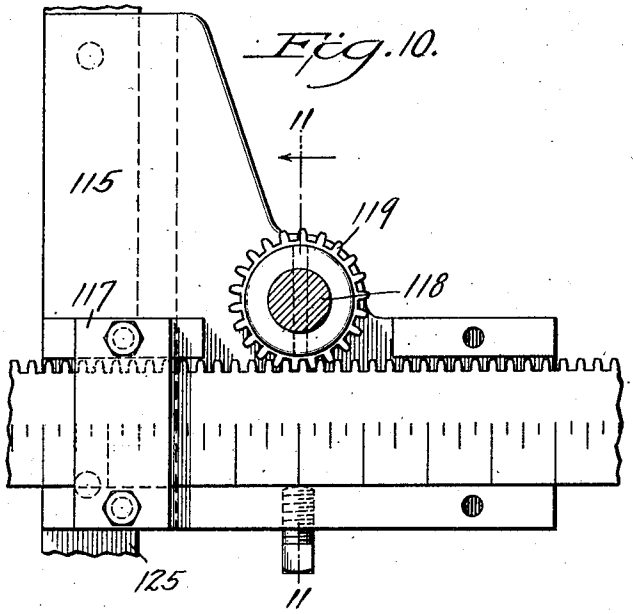


Fig. 11.

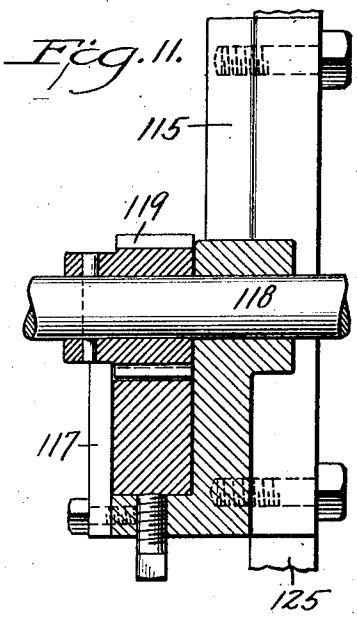


Fig. 12.

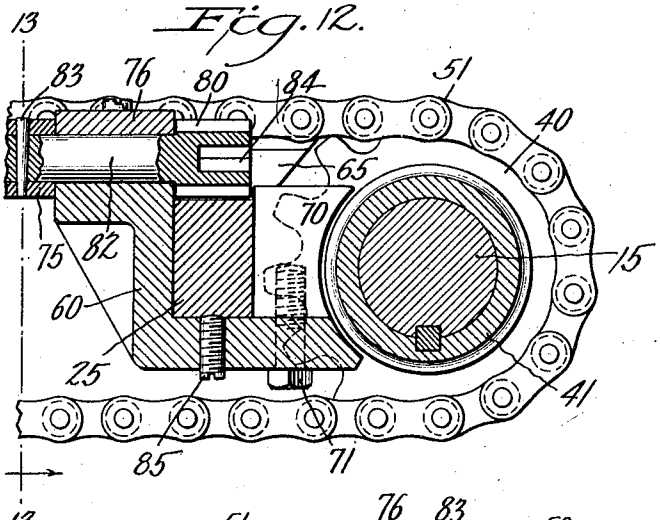


Fig. 14.

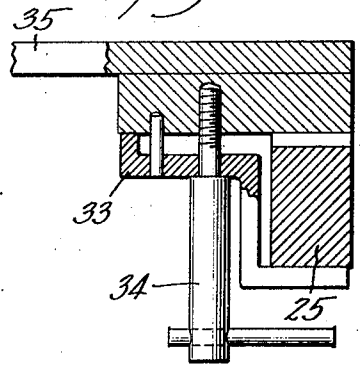
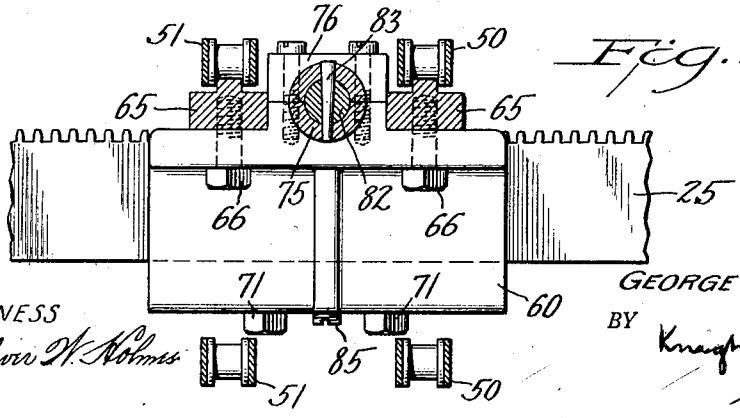


Fig. 13.



WITNESS

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Patented Mar. 19, 1929. 1,706,366

UNITED STATES PATENT OFFICE.

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BOX-BLANK-TRIMMING MACHINE.

Application filed April 9, 1926. Serial No. 100,910.

The present invention relates to improvements in machines for trimming scored and slotted box blanks for accurately trimming off excess portions of the blanks. In order that the invention may be fully understood, it will first be described with reference to the accompanying drawings and the novelty afterwards more particularly pointed out in the annexed claims.

In said drawings:

Figure 1 is a side elevation of the improved machine showing it attached to the delivery end of the blank feeding and scoring mechanism;

Figure 2 is an end view of the improved machine;

Figure 3 is a sectional plan view of the same the upper part of the auxiliary frame carrying the adjustable supports for the folding guides being omitted;

Figure 4 is an enlarged detail vertical transverse sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a vertical longitudinal sectional view of the same taken on the line 5—5 of Figure 3;

Figure 6 is an enlarged detail transverse sectional view illustrating the operation of the trimming cutters and the flap elevating and folding devices;

Figures 7 and 8 are detail views of the blank feeding chain, Figure 8 being a transverse section taken on the line 8—8 of Figure 7;

Figure 9 is a vertical sectional view taken on the line 9—9 of Figure 2;

Figures 10 and 11 are enlarged detail sectional views illustrating the adjustable folding guides, Figure 11 being taken on the line 11—11 of Figure 10;

Figure 12 is an enlarged detail longitudinal sectional view showing the adjustable mounting for the feed chains;

Figure 13 is a detail transverse sectional view taken on the line 13—13 of Figure 12;

Figure 14 is a detail sectional view illustrating one of the adjustable clamping devices employed for securing the side guides and center support in the desired positions.

In the manufacture of scored and slotted blanks for making boxes it is a common practice to pass the blank sheets through suitable machines for scoring and slotting to produce blanks with the desired number and size of flaps and to afterwards trim off certain of the flaps that are unnecessary in producing the particular form of box desired. The improved machine has been designed for uniformly and efficiently trimming otherwise completed blanks preparatory to folding the blanks into boxes.

The improved machine is illustrated in the accompanying drawings as attached to the delivery end of a blank creasing machine. The particular creasing mechanism illustrated is covered by Letters Patent No. 1,579,738, granted to me April 6, 1926.

This patented creasing mechanism includes suitable blank feeding rollers indicated at A, B and C and cooperating creasing rolls indicated at D and E. These feed and creasing rolls are suitably geared to operate in unison and the creasing rolls being normally separated for the free passage of blanks, are intermittently thrown into creasing position by means of the rotating segmental cams F. As illustrated creased and slotted box blanks are delivered from the final feed rollers C to the feeding and controlling devices of the improved blank trimming mechanism which will now be described.

The improved machine is built upon a suitable framework comprising essentially the main side frames 1, 2 extending up from the base 3 and supporting in suitable bearings a transverse shaft 5 upon which are adjustably mounted the flap raising and folding cam segments hereinafter described. The shaft 5 carries a sprocket wheel 6 around which operates a sprocket chain 7 extending around and driven by a sprocket wheel 8 mounted upon the shaft 9 of the creasing mechanism.

Bearing blocks or brackets 10 are mounted upon the side frames 1, 2 and have journalled in them a rotary shaft 15 which carries the under members of the trimming cutters and the adjustable sprockets of the feed mechanism as hereinafter explained. This shaft 15 has keyed to one end a sprocket wheel 16 around which operates a sprocket chain 17 extending around and driven by a sprocket wheel 18 mounted upon shaft 19 geared at 20 to a driving gear 21 upon shaft 22 of the creasing mechanism.

25 and 26 are rack bars extending transversely of the machine in approximately the same horizontal plane as rotating shaft 15. These rack bars 25 and 26 are rigidly se-

cured to suitable parts of the machine frame at their opposite ends and serve the purpose of supports for the adjustable mountings of the blank guides and the feed chains as will now be described.

There are two side guides indicated at 30 and 31 which are formed of angle bars having horizontal webs in the plane of feed and vertical flanges which act as guides. These side guides 30 and 31 are provided near their opposite ends with spacer blocks or fillers 32 resting upon the toothed upper edge of rack bars 25 and 26 and secured in place thereon by means of clamping brackets 33 and screw members 34. The brackets 33 and the screw members 34 are best shown in Figure 14, the rack bars. The leading-in ends of guide in the desired adjusted position upon the rack bars. The leading-in ends of guide bars 30 and 31 project over the shafts of lower feed rollers C and curve downwardly to prevent interference with the blank as it moves from the creasing machine into the improved trimming machine.

Centrally between the side guides 30 and 31 is a horizontal bridging under-guide 35 also mounted upon the rack bars 25 and 26 by means of brackets 33 and screw members 34. Figure 14 shows the mounting as applied to the central guide 35. It will be understood that the same form of clamps 33 is used upon both the side guides 30, 31 and the central guide 35.

The feeding mechanism for conveying box blanks through the machine comprises two sets of endless conveyor chains provided with blank engaging dogs or cleats and mounted for adjustment toward and away from each other transversely of the machine. This feeding mechanism will now be described. Splined upon the rotary shaft 15 upon each side of the central bridging guide 35 is a pair of sprocket wheels 40 connected by a supporting spool or hub 41. In the same manner a pair of sprocket wheels 45 connected by a spool or hub 46 is splined upon the shaft 47 of the delivery feed rollers C above referred to. Parallel endless sprocket chains 50, 51 pass around the twin sprocket wheels 40 and 45 with their upper run in the horizontal plane of guides 30, 31 and 35. These parallel sprocket chains 50, 51 have mounted between them feeding dogs or cleats 55 preferably of the construction shown in Figures 7 and 8 of the drawings. These feed dogs or cleats consist of plates formed with an under blank engaging flange or ledge 56 and an over-hanging edge 57 to effectively engage and confine the rear edge of the blank. Each plate is mounted upon the chains by means of angular brackets 58 pivotally mounted at 59 upon opposite journal pins of the sprocket chains 50, 51.

Laterally adjustable brackets are mounted upon the transverse rack bars 25 and 26 between the chains 50 and 51. These brackets are shown at 60 and 61 partly embracing the rack bars and connected by track bars 65 which extend longitudinally of the machine beneath the upper runs of the conveyor chains and afford supporting tracks for the usual anti-friction rolls or sleeves of the links of the chains for maintaining the upper runs of the chains accurately in the feeding plane. The track bars 65 are rigidly secured to the brackets 60 and 61 by the bolts 66. A block 70 is mounted upon each of the brackets 60 by bolts 71, one of said blocks 70 being presented between each pair of sprocket wheels 40, 45 for the purpose of shifting the sprocket wheels upon their supporting shafts laterally of the machine when the brackets are adjusted.

A shaft 75 extending between the chains 50, 51 is journalled near its opposite ends in bearings 76, 77 carried by the brackets 60, 61. This shaft 75 is provided at its opposite ends with pinions 80, 81 in constant mesh with the teeth of rack bars 25 and 26. The pinion 80 which meshes with rack bar 25 is formed upon a short shaft section 82 pinned to the adjacent end of the hollow shaft 75 as shown at 83 in Figure 12 of the drawings. This short shaft portion 82 is formed in its end with a wrench socket 84 for the reception of the shaped end of a pin wrench which upon insertion in said socket enables the operator to rotate shaft 75 for shifting the brackets 60, 61 and the chains and sprocket wheels uniformly transversely of the machine. Each of the brackets 60 and 61 carries a set screw 85 which passes through the bottom wall of the bracket and engages the under surface of one of the rack bars to secure the brackets in the desired adjusted position. When the chains and supporting sprocket wheels are adjusted, it will of course be understood that the set screws 85 are first loosened to free the brackets upon the rack bars, and after the adjustment has been accomplished, these set screws are again tightened up.

It will be understood that there are two sets of feed chains 50, 51 provided with feed dogs or cleats 55 and that these feed chains are arranged on opposite sides of the central guide 35. Each mechanism is a duplicate of the other as described and each can be independently adjusted transversely of the machine to set them in the preferred location for the particular size of box blanks to be operated upon. In mounting the two sets of feed chains the feeding dogs or cleats 55 are arranged to be presented in exact alignment transversely of the machine.

At the delivery end of the machine two pairs of cooperating rotary trimming cutters are provided for trimming off the excess portions of the box blanks. The lower cutter members are indicated at 90 suitably clamp-

ed upon the shaft 15 at opposite sides of the central longitudinal vertical plane of the machine. These cutters 90 may be adjusted upon their supporting shaft transversely of the machine to place them in the proper longitudinal planes to effect the trimming cuts at the points desired.

The upper cutter of each pair comprises a circular cutter 95 mounted upon a rotary shaft 96 journalled in the bearing bracket 10 and carrying a gear 97 in constant mesh with a gear 98 secured to the shaft 15 referred to. Each of these short shafts 96 extends from the bearing block 10 inwardly toward the center of the machine and is held in the desired position by means of the collars 99, 101, the first of which engages the inner face of bearing bracket 10 while the other is the integral hub of the gear 97. By loosening the set screws which secure collars 99 and 101 to the shaft 96, said shaft with its cutter 95 can be adjusted transversely of the machine to suit the adjustment of the lower cutter 90 with which it cooperates. It will be understood that the cooperating trimming cutters 90, 95 are duplicated upon opposite sides of the machine, the short shafts 96 presenting an open path above the plane of feed between the inner faces of upper cutters 95.

100 represents an adjustable bracket through which the shafts 15 and 96 extend on each side of the machine, said shafts being free to rotate in said bracket, and the bracket being adjustable thereon transversely of the machine. There is a bracket 100 at each side of the machine. Each of the brackets 100 carries on its inner face a yoke 105 embracing the rack bar 25 and clamped in the desired adjusted position transversely of the machine by means of a set screw 106 which passes through a wall of the bracket and engages the rack bar or a shim 107, this part of the structure being shown particularly in Figure 9 of the drawings. The purpose of the brackets 100 will presently appear.

Upwardly projecting auxiliary frame bars 110 are secured to the main side frames at 111 and have attached to their upper ends at 112 the parallel rack bars 113 and 114 which extend transversely of the machine. One of these rack bars 113 has marked upon one face a scale indicated in Figure 2 to facilitate the adjustment of the parts mounted upon said rack bars.

Slidingly mounted upon each rack bar 113 and 114 are two brackets 115 and 116, each bracket having a guideway embracing the rack bar and confined thereon by metal straps 117. The brackets 115 of both rack bars are connected by means of a shaft 118 freely journalled in suitable bearings in the brackets and carrying adjacent its opposite ends pinions 119 which mesh with the teeth of the rack bars. The shaft 118 carries at one end a handwheel 120 by means of which the carriage formed by the coupled brackets 115 can be moved upon the rack bars transversely of the machine. In the same way brackets 116 sliding upon the two rack bars are coupled by means of a shaft 118 provided with pinions 119 and a handwheel 120^a.

Rigidly mounted upon and projecting downwardly from the adjustable brackets 115 and 116 are arms 125, each longitudinally arranged pair of which support a folding gauge 130 which extends longitudinally of the machine and is presented just above the plane of feed to permit free space beneath it for the passage of a box blank carried forward by the feed mechanism. These folding gauges 130 are, by the means described, adjustable transversely of the machine and when in operation are set at equal distances from the side guides 30 and 31.

The shaft 5 above referred to has adjustably mounted upon it two cam carrying wheels 135, each of which is formed with a peripheral slot 136 of T-shape in cross-section. Each of these wheels 135 carries one or more flap raising and folding cam segments such as shown at 140. Each of these cam segments 140 is formed with a base flange accurately fitting the slotted periphery of a wheel 135 and a headed bolt 141 adjustably mounted in the slot 136 of the wheel passes through the flange of the cam segment and receives a nut 142 by which the cam segment is secured in the desired position on the periphery of its supporting wheel.

These cam wheels 135 are adjusted transversely of the machine to present them just outside of the fold gauges 130 above referred to and the periphery of the wheels being presented below the plane of feed of blanks, the cam segments 140 will be projected above the plane of feed once for each revolution of the cam wheels. This action of the cam segments is brought about at the proper moment to engage and fold upwardly opposite flaps upon a blank, the fold being against the gauges 130.

Arranged in the same longitudinal vertical planes as the flap folders 140 are the rearwardly tapered flap engaging guide plates 150 which serve to retain the upwardly folded blank flaps in upright position as they pass from the cam segments 140 and hold said flaps upright and cause them to pass between the inner ends of shafts 96 and upper cutters 95, while the parts of the blank that have not been thus elevated will pass between the upper and lower paths of the cutters and be trimmed off.

Each of these tapered flap guiding plates 150 is rigidly mounted at the inner end of a supporting flat bar 160 which is adjustably

mounted in the upper edge of one of the brackets 100 and is provided at its outer end with a handle 161. This flat bar 160 is mounted in recessed upper face of bracket 100 and is confined and clamped therein in the desired adjusted position by means of a strap bar 165 secured by wing bolts 166 shown particularly in Figure 9 of the drawings. The bars 160, one on each side of the machine, are preferably provided with scale markings on their upper faces to facilitate the adjusting operation.

In Figure 3 of the drawings, one form of box blank is represented by dot and dash lines passing through the trimming machine. In this illustration the two narrow flaps at the leading edge of the blank are passing through the trimming cutters and having the excess portions of said flaps trimmed off. The next succeeding broad flaps of the blank have been raised by cam segments 140 and are about to pass into engagement with the flap guiding plates 150 which will hold said flaps in raised position while they pass between the two sets of trimming cutters, this relation of the blank being clearly shown also in Figure 2 of the drawing. The action of the cam segments in folding upwardly opposite flaps against the fold gauges 130 is clearly shown in Figure 4 of the drawings.

It will be understood that the purpose and operation of the improved machine is illustrated and described with reference to a simple form of slotted and scored box blank, the arrangement being such that the alternating narrow flaps are cut off by the trimming cutters while intermediate wide flaps are folded up and supported out of the path of the trimming cutters. By the proper adjustment the machine can be arranged to trim any size or design of box blank. If a particular form of blank has more of the cut-out flaps to be folded up and passed between the cutters without trimming, it will be understood that additional flap raising segment cams 140 can be applied to the cam wheels and adjusted to cooperate with the feed mechanism at the proper intervals.

I claim:—

1. In a machine of the character described, the combination with rack-bars arranged transversely with respect to the path of a blank, rotary transverse shafts arranged adjacent to said rack-bars, laterally-spaced sprocket wheels splined to each of said shafts, brackets slidable on said rack-bars, said brackets being provided with means for movably engaging said sprocket-wheels for displacing them axially along said shafts, endless sprocket-chains movably connecting corresponding sprocket wheels on said shafts, a rotary shaft journalled at opposite ends in said brackets and having geared connections with said rack-bars, and blank-engaging means carried by said sprocket-chains.

2. In a machine of the character described, the combination with blank-feeding mechanism, of parallel rack-bars arranged transversely with respect to the path of a blank moved by said blank-feeding mechanism, rotary shafts respectively arranged adjacent to said rack-bars, twin sprocket wheels mounted on each of said shafts, said sprocket wheels being splined to said shafts, brackets slidable on said rack-bars, means carried by said brackets for axially moving said sprocket wheels along said shafts, endless sprocket-chains movably connecting the corresponding sprocket-wheels on said shafts, a rotary shaft journalled at opposite ends in said brackets and having its opposite ends geared to said rack-bars, and blank-engaging means carried by said sprocket-chains.

3. In a machine of the character described, the combination with parallel rack-bars arranged transversely with respect to the path of a blank moved thru said machine, rotary transverse shafts arranged adjacent to said rack-bars, a pair of twin sprocket wheels splined to each of said shafts by means of a spool connecting and supporting the sprocket wheels of each pair, brackets slidable on said rack-bars, each of said brackets being provided with a block interposed between and movably engaging the sprocket-wheels of one pair, endless sprocket-chains movably connecting corresponding sprocket wheels on said shafts, a rotary shaft journalled in said brackets and having geared connections with said rack-bars, angle-brackets carried by said endless chains, and a plate secured to said angle brackets and having a forwardly presented edge overhanging and spaced from said endless chains.

4. In a machine of the character described, the combination with blank-feeding mechanism, of parallel rack-bars arranged transversely with respect to the path of a blank moved by said blank-feeding mechanism, rotary transverse shafts arranged adjacent to said rack-bars, laterally-spaced sprocket-wheels splined to said shafts, brackets slidable on said rack-bars, each of said brackets being provided with a block interposed between and movably engaging the sprocket-wheels on the shaft adjacent thereto, endless sprocket-chains movably connecting the corresponding sprocket wheels on said transverse shafts, a rotary shaft journalled at opposite ends in said brackets on said shafts, gear pinions mounted on the last-mentioned rotary shaft and meshing with said rack-bars, and blank-engaging means carried by said sprocket-chains.

5. In a machine of the character described, the combination with parallel rack-bars arranged transversely with respect to the path of a blank moved by said blank-feeding mechanism, of rotary shafts arranged paral-

lel and adjacent to said rack-bars, laterally-spaced sprocket wheels splined to each of said shafts, brackets slidable on said rack-bars, and movably engaging the sprocket wheels on the shafts adjacent thereto, endless sprocket-chains movably connecting each sprocket wheel on one of said transverse shafts to a sprocket wheel on the other of said transverse shafts, a rotary shaft journalled at opposite ends in said brackets, gear pinions mounted on the last-mentioned rotary shaft and respectively meshing with said rack-bars, angle brackets carried by said sprocket-chains and having flanges presented above the upper surfaces of said sprocket chains, and plates secured to said flanges, said plates having their forwardly-presented edges overhanging said upper surfaces of the sprocket-chains and provided with depending ledges for engaging the rear edges of blanks to be propelled by said sprocket-chains.

6. In a machine of the character described, the combination with laterally-spaced pairs of endless sprocket-chains, of track-bars supportably engaging the upper runs of said sprocket-chains, and plates carried by each pair of said sprocket-chains, said plates having their forwardly-presented edges overhanging and spaced from the upper surfaces of said sprocket-chains and provided with depending ledges for engaging the rear edges of blanks to be propelled by said sprocket-chains.

7. In a machine of the character described, the combination with laterally-spaced sprocket-chains, of oppositely-arranged angle brackets carried by said sprocket-chains and having flanges inwardly-presented towards each other above the upper surfaces of said sprocket chains, and plates secured to said flanges and having their forwardly-presented edges overhanging said upper surfaces of the sprocket-chains for constraining the rear edges of blanks to be propelled by said sprocket-chains.

8. In a machine of the character described, the combination with laterally-spaced endless sprocket-chains, of a plate extending across and spaced above the upper runs of said sprocket-chains, means for securing said plate to each of said sprocket-chains with its forwardly-presented edge overhanging the upper surfaces of said sprocket-chains, said plate being adapted to confine the rear edge of a blank.

9. In a machine having means for feeding blanks, the combination with laterally-spaced folding guides, of rotating cam-supporting wheels provided with peripheral slots, of cam segments mounted upon said wheels and movable thereby into and out of cooperative relation to said laterally-spaced folding guides for folding the flaps of a blank moved by said blank-feeding means, and means adjustably engaging in said peripheral slots for securing said cam segments to said wheels.

10. In a machine having means for feeding blanks, the combination with laterally-spaced folding guides, of cam-supporting wheels rotatable on an axis transversely disposed with respect to said folding guides, cam segments adjustable along the peripheries of said wheels and movable thereby into and out of the plane of a blank moved by said blank-feeding means, and means for securing said cam segments in adjusted positions to said wheels.

11. In a machine having means for feeding blanks, the combination with laterally-spaced folding guides, of rotary cam-supporting wheels, and cam segments mounted upon said wheels and movable thereby into and out of cooperative relation to said folding guides, said cam segments being provided with flap-engaging surfaces inclined with respect to said folding guides.

12. In a machine of the character described, the combination with a lower cutter-shaft provided with laterally-spaced lower cutters, of upper cutter shafts provided with cutters adapted respectively to cooperate with said laterally-spaced cutters on the lower cutter shaft, and laterally-spaced brackets slidable axially along said lower cutter shaft and rotatably engaging said upper cutter shafts.

13. In a machine of the character described, the combination with a lower cutter-shaft provided with laterally-spaced lower cutters, of axially-adjustable upper cutter shafts provided with cutters adapted respectively to cooperate with said laterally-spaced cutters on the lower cutter shaft, and laterally-spaced brackets slidable axially along said lower cutter shaft and rotatably engaging said upper cutter shafts respectively.

14. In a machine of the character described, the combination with a lower cutter-shaft provided with laterally-spaced lower cutters, of axially-adjustable upper cutter shafts provided with cutters adapted respectively to cooperate with said laterally-spaced cutters on the lower cutter shaft, laterally-spaced brackets slidable axially along said lower cutter shaft and rotatably engaging said upper cutter shafts respectively, and a flap-guide adjustably mounted on each of said adjustable brackets.

15. In a machine of the character described, the combination of means for feeding blanks, folding guides supported above the plane of feed in parallel relation longitudinally of the machine, rotating cam-supporting wheels mounted beneath the plane of feed and formed with peripheral slots, cam segments mounted upon said wheels and operating in the plane of feed for raising flaps upon a moving blank and

folding the raised flaps against said folding guides, headed bolts mounted in the peripheral slots of said wheels and engaging said cam segments for adjustably mounting the same, spaced trimming cutters arranged approximately in the vertical longitudinal planes of said folding guides, and flap guiding plates mounted adjacent to said cutters and adapted to engage raised flaps and guide them between and free of said cutters.

16. In a machine of the character described, the combination of means for feeding blanks, transversely adjustable folding guides supported above the plane of feed in parallel relation longitudinally of the machine, a rotary shaft mounted beneath the plane of feed, wheels mounted upon said shaft and adjustable thereon transversely of the machine, cam segments adjustably mounted upon said wheels and operating in the plane of feed for raising flaps upon a moving blank and folding the raised flaps against said folding guides, spaced trimming cutters arranged approximately in the vertical longitudinal planes of said folding guides, and adjustable transversely of the machine, and flap guiding plates mounted adjacent to said cutters and adapted to engage raised flaps and guide them between and free of said cutters, said flap guiding plates being adjustable transversely of the machine.

17. In a machine of the character described, the combination of a suitable frame, means for feeding blanks, fixed rack bars spaced longitudinally of the machine and extending transversely of said frame, brackets movably mounted upon said rack bars, a shaft extending longitudinally of the machine and journalled in said brackets, pinions mounted upon said shaft and meshing with said rack bars, means for rotating said pinion shaft for simultaneously moving said brackets, and blank controlling means supported upon said brackets.

18. In a machine of the character described, the combination of a suitable frame, fixed rack bars extending transversely of said frame, rotary shafts mounted in said frame parallel to said rack bars, sprocket wheels splined upon said shafts, brackets mounted upon said rack bars, a pinion shaft journalled in said brackets and extending longitudinally of the machine between said brackets, pinions mounted upon said pinion shaft and meshing with said rack bars, means for rotating said pinion shaft, blocks upon said brackets engaging said sprocket wheels, and an endless sprocket chain operating upon said sprocket wheels and carrying feed dogs or cleats.

19. In a machine of the character described, the combination of a suitable frame, fixed rack bars extending transversely of said frame, rotary shafts mounted in said frame parallel to said rack bars, coupled twin sprocket wheels splined upon said shafts, brackets adjustably mounted upon said rack bars, a pinion shaft journalled in said brackets and extending longitudinally of the machine between said brackets, pinions mounted upon said pinion shaft and meshing with said rack bars, means for rotating said pinion shaft, projections upon said brackets engaging between said twin sprocket wheels, two parallel endless sprocket chains operating upon said twin sprocket wheels, and feed dogs or cleats carried by and extending transversely between said parallel chains.

20. In a machine of the character described, the combination of a suitable frame, fixed rack bars extending transversely of said frame, rotary shafts mounted in said frame parallel to said rack bars, two pairs of twin sprocket wheels splined upon each of said shafts, two brackets adjustably mounted upon each of said rack bars, two pinion shafts extending longitudinally of the machine and journalled in and coupling opposite brackets, pinions mounted upon said pinion shafts and meshing with said rack bars, means for rotating said pinion shafts, blocks upon said brackets projecting between said twin sprocket wheels, two pairs of parallel endless sprocket chains operating upon said twin sprocket wheels, and feed dogs or cleats carried by and coupling each pair of sprocket chains.

21. In a machine of the character described, the combination of a suitable frame, means for feeding blanks, an auxiliary overhead frame supporting spaced transversely extending rack bars, connected brackets adjustably mounted upon said rack bars, a shaft journalled in each pair of said connected brackets, pinions carried by said shafts and meshing with said rack bars, arms depending from said brackets toward the plane of feed, folding guides mounted upon said arms and supported in spaced relation above the plane of feed, means cooperating with said folding guides for raising and folding blank flaps, and suitable trimming cutters arranged upon opposite sides of the plane of feed.

22. In a machine of the character described, the combination with a lower cutter-shaft provided with laterally-spaced lower cutters, of axially-adjustable upper cutter shafts provided with cutters adapted respectively to cooperate with said laterally-spaced cutters on the lower cutter shaft, laterally-spaced brackets slidable axially along said lower cutter shaft and rotatably engaging said upper cutter shafts respectively, a transverse bar adjustable endwise in each of said brackets, and a flap-guiding plate mounted on the inner end of said adjustable transverse bar.

23. In a machine of the character described, the combination with oppositely-arranged side frames, of a lower cutter-shaft journalled therein, laterally-spaced lower cutters secured to said lower cutter-shaft, a transverse bar extending from one side-frame to the other, laterally-spaced brackets slidable on said lower cutter-shaft and slidably engaging said transverse bar, means for securing said laterally-spaced brackets to said transverse bar in their adjusted positions, and axially-spaced upper cutter shafts journalled in said side-frames respectively and rotatably supported by said adjustable brackets respectively.

24. In a machine of the character described, the combination with oppositely-arranged side frames, of a lower cutter-shaft journalled therein, laterally-spaced lower cutters adjustable axially on said lower cutter-shaft, a transverse bar extending from one side-frame to the other, laterally-spaced brackets adjustable axially along said lower cutter-shaft and slidably engaging said transverse bar, means for securing said laterally-spaced brackets to said transverse bar in their adjusted positions, and axially-spaced upper cutter shafts journalled in said side-frames respectively and rotatably supported by said adjustable brackets respectively, said upper cutter shafts being adjustable axially in said side frames and brackets.

25. In a machine of the character described, the combination with oppositely-arranged side frames, of a lower cutter-shaft journalled therein, laterally-spaced lower cutters secured to said lower cutter-shaft, a transverse bar extending from one side-frame to the other, laterally-spaced brackets slidable on said lower cutter-shaft and slidably engaging said transverse bar, means carried by each of said laterally-spaced brackets for releasably engaging said transverse bar, axially-spaced upper cutter shafts, each of said upper cutter shafts being rotatably mounted in one of said side-frames and one of said adjustable brackets, a transverse bar adjustable endwise in each of said brackets, and a flap-guiding plate mounted on the inner end of said adjustable transverse bar.

26. In a machine of the character described, the combination with a rack-bar arranged transversely with respect to the path of a blank moved through said machine, a rotatary lower cutter shaft arranged parallel to said rack-bar, laterally-spaced wheels splined to said lower cutter shaft for driving a blank-conveyor, a block slidable on said rack-bar and provided with a pinion meshing with said rack-bar, said block bearing against said laterally-spaced wheels for adjusting their positions on the lower cutter shaft, a bracket slidable on said lower cutter-shaft and bearing on said rack-bar, means for securing said bracket to said rack-bar in its adjusted positions, and an axially-adjustable upper cutter shaft rotatably supported by said adjustable bracket.

27. A trimming machine of the character described, comprising, means for feeding a blank, means for moving a section of the blank, means for trimming another section thereof, and means for operating said moving means in timed relation with said feeding means.

28. A trimming machine of the character described, comprising, means for feeding a blank, a trimming cutter, means for moving a blank section, means for operating said moving means in timed relation with said feeding means, and means for guiding the section so as to avoid the cutter.

29. A trimming machine of the character rescribed, comprising, means for feeding a blank, a trimming cutter, and means operating in timed relation with said feeding means for moving selected sections of the blank so as to avoid said cutter.

30. A trimming machine of the character described, comprising, means for feeding a blank, a trimming cutter, a deflector, and means for operating said deflector in timed relation with said feeding means adapted to deflect a section of the blank so as to avoid said cutter.

31. A trimming machine of the character described, comprising, means for feeding a blank, a trimming cutter, a deflector, and means for operating said deflector successively in timed relation with said feeding means adapted to deflect successive selected sections of the blank so as to avoid said cutter.

32. A trimming machine of the character described, comprising, means for feeding a blank, a trimming cutter, a deflector, means for operating said deflector moving in timed relation with said feeding means adapted to deflect a section of the blank, and a guide adapted to engage the deflected section in front of said cutter and guide the same to one side of said cutter.

33. A trimming machine of the character described, comprising, means for feeding a blank having cut sections, a trimming cutter, and means adapted for adjustment and operation to move any of the blank sections so as to avoid said cutter.

34. A trimming machine of the character described, comprising, means for feeding a blank having cut sections, a trimming cutter, deflecting means for moving the blank sections to avoid said cutter, and means for operating said deflecting means adjustable to cause the latter to engage any blank section.

35. A trimming machine of the character described, comprising, means for feeding a

blank, a trimming cutter, means for successively folding selected sections of the blank so as to avoid said cutter, and adjustable means for setting the interval between sections.

36. A trimming machine of the character described, comprising, means for feeding a blank, a trimming cutter, a deflector moving successively in timed relation with said feeding means adapted to deflect successive selected sections of the blank so as to avoid said cutter, and adjustable means for setting the interval between sections.

GEORGE W. SWIFT, JR.