Feb. 15, 1966 J. ARMSTRONG, JR., ETAL 3,235,149

BLANK STRIPPER

Filed Oct. 6, 1961 4 Sheets-Sheet 1

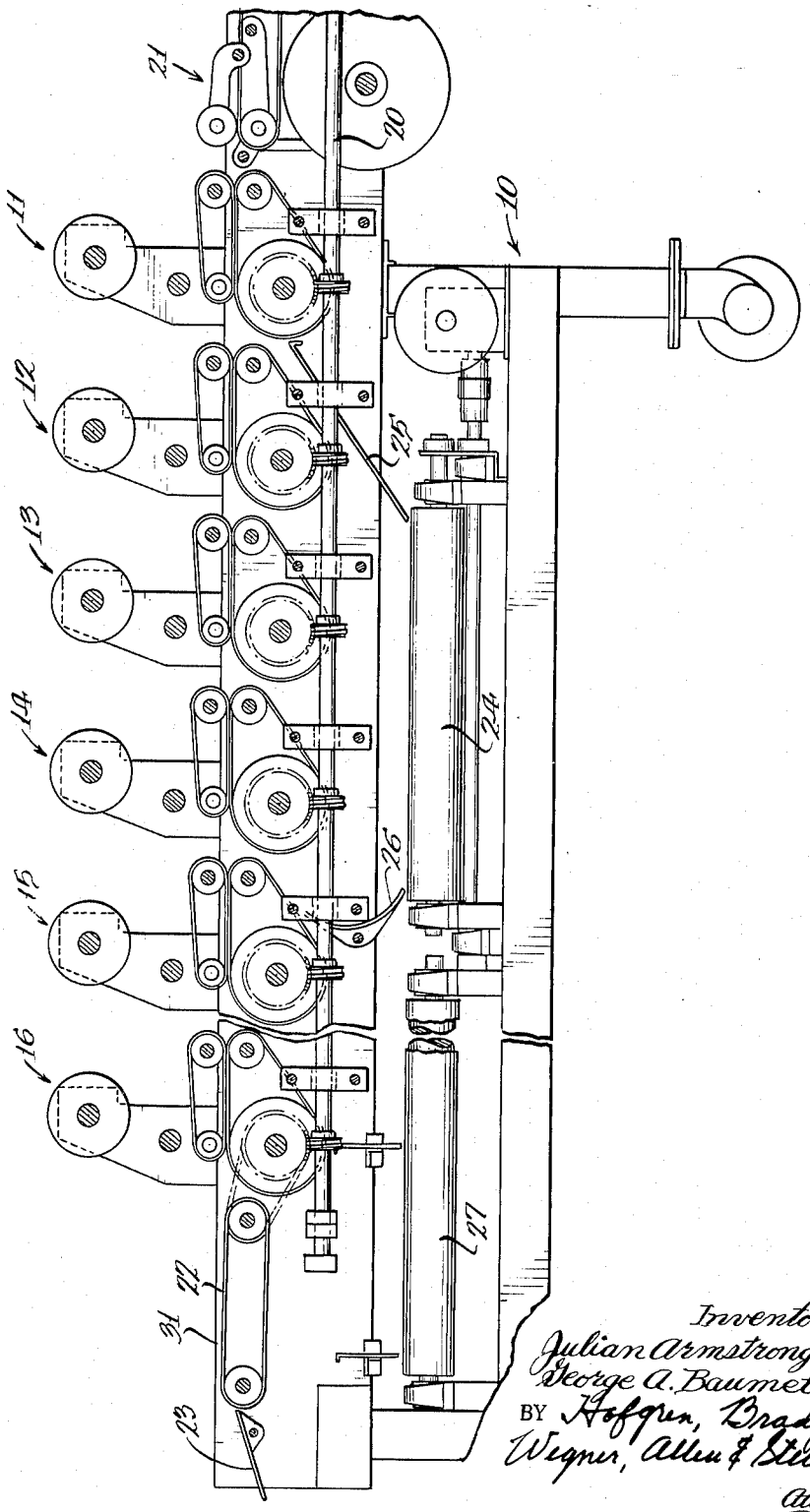



Fig. 1.

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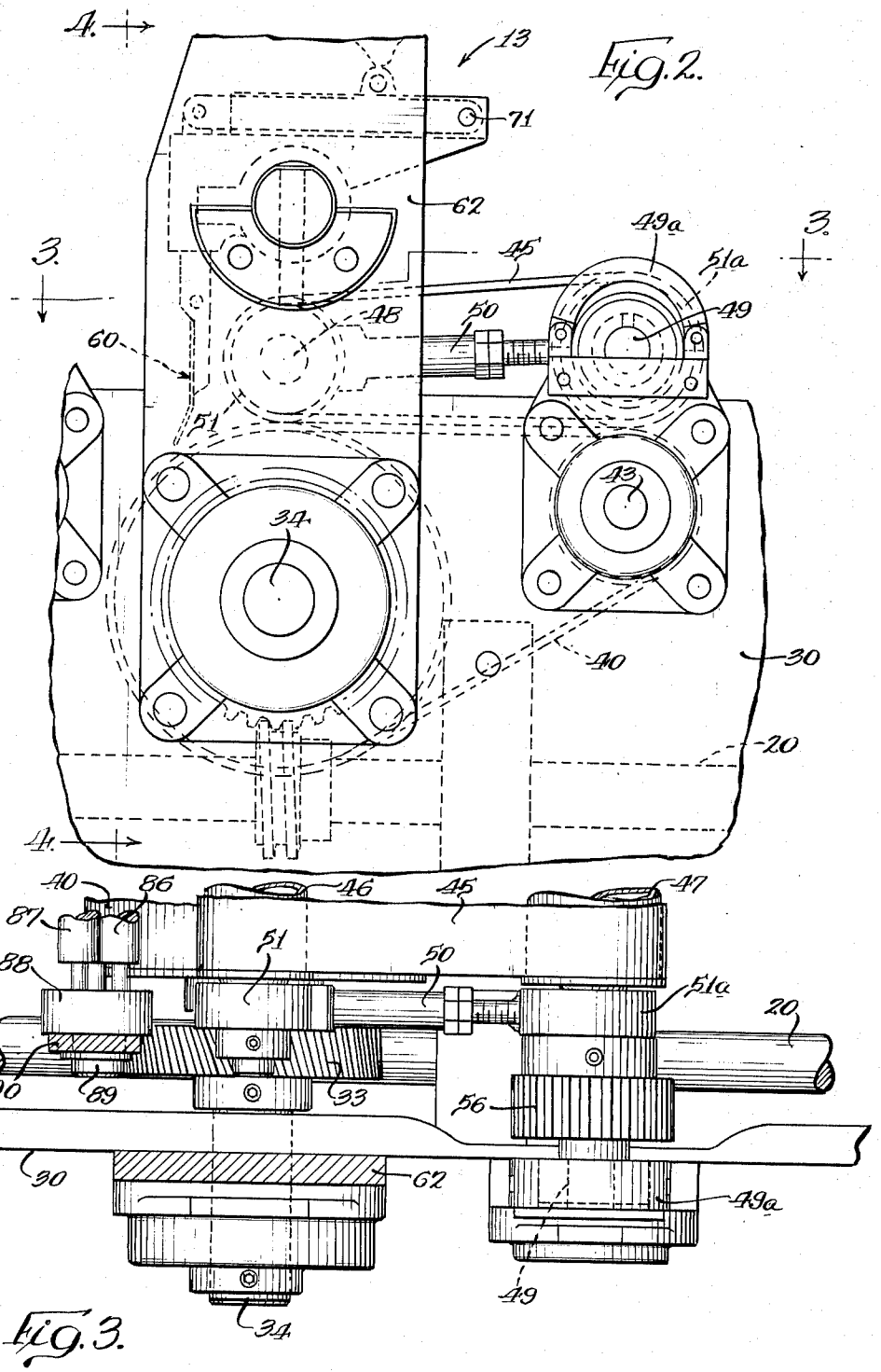



Fig. 2.

Fig. 3.

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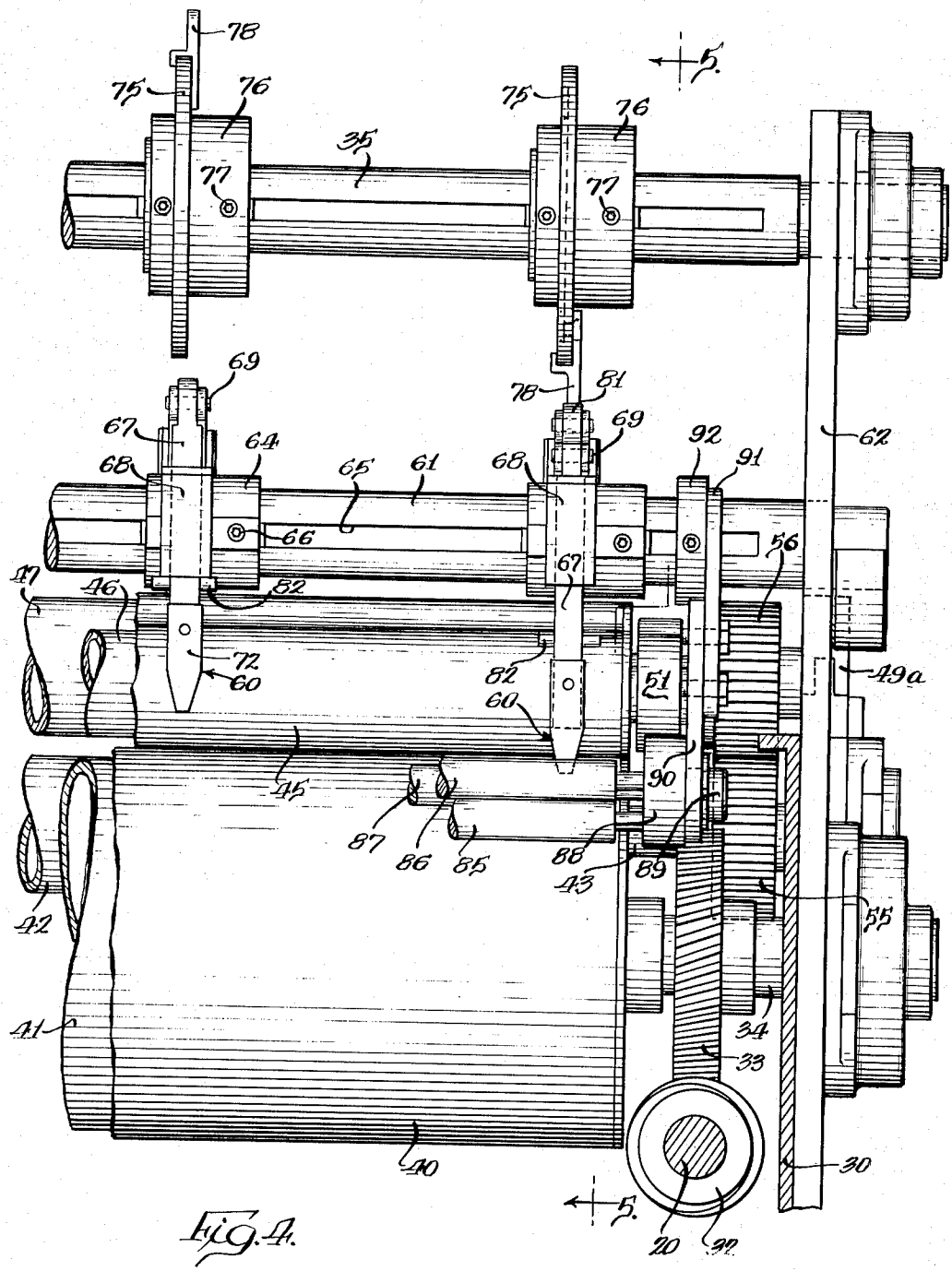


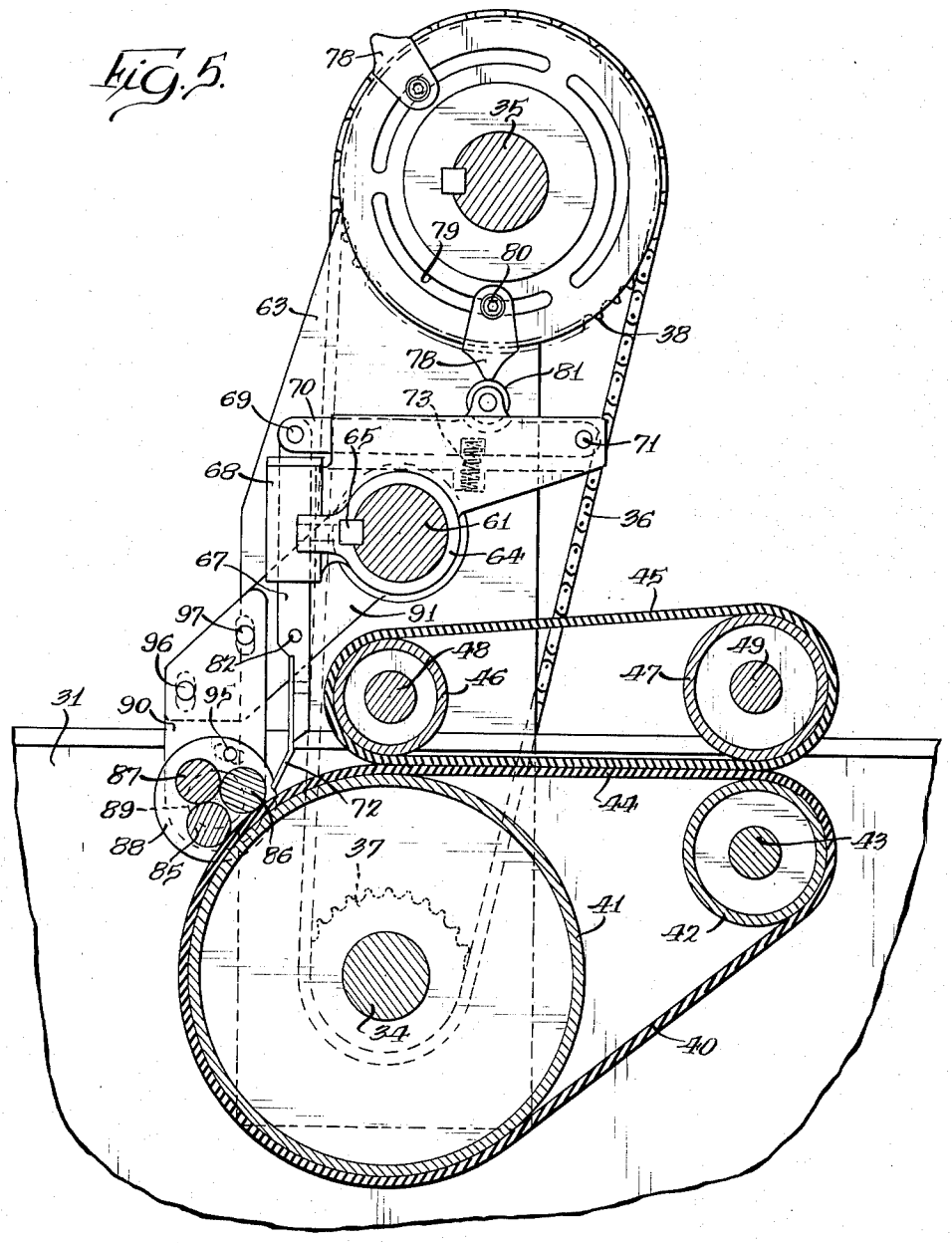

Fig. 4.

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Fig. 5.



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3,235,149

# BLANK STRIPPER

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7 Claims. (Cl. 225—97)

This invention relates to blank stripping mechanism and, more particularly, to versatile mechanism for simultaneously or individually stripping blank sections from a blank in which in successive runs, the blank sections may vary in size or location.

As presently known, blank stripping mechanisms are cumbersome devices arranged primarily to accomplish a specific job in removing blank sections from a blank and in which damage can readily occur to the usable parts of the blank due to the use of perforating pins or the like or the mechanisms are limited in use due to the location of the blank section relative to the remainder of the blank or "halo."

An object of the invention is to provide a new and improved blank stripping mechanism capable of substantially universal use with a minor number of simple adjustments and in which parts are self-adjusting.

Another object of the invention is to provide a blank stripping mechanism as defined in the preceding paragraph in which the mechanisms are constructed and located for stripping blank sections located in any manner relative to the blank of paperboard or the like and which are severed therefrom, or partially severed, by a previous die cut or rotary knife operation.

Still another object of the invention is to provide blank stripping mechanism in which one or more knockout fingers are provided in a stripping unit and are movable relative to the blank to accomplish the knockout action, with the knockout fingers being adjustable in timing relative to the advance of the blank and also being adjustable to accommodate for location of a blank section relative to the blank. An added feature comprises means for receiving a deflected blank section and removing the blank section from the remainder of the blank including a nest of rollers mounted for floating adjustment with at least one of the nest of rollers coacting with another conveying element to be driven thereby and receive the blank section therebetween and a second of said nest of rollers being driven from the first roller and being positionable to assist in advance of a bank from the stripping unit.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a vertical section of a machine having a plurality of successive stripping units taken immediately to the interior of one side plate of the frame and with parts broken away and with conveying mechanism associated therewith;

FIG. 2 is a side elevational view on an enlarged scale of a single stripping unit of the line of units shown in FIG. 1 with an upper part omitted;

FIG. 3 is a horizontal section taken generally along the line 3—3 in FIG. 2;

FIG. 4 is an end elevational view of a stripping unit and taken generally along the line 4—4 in FIG. 2 and with the mechanism shown at one side of the machine; and

FIG. 5 is a vertical section taken generally along the line 5—5 in FIG. 4.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the



invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

A machine for stripping successive blank sections or groups of blank sections is shown in FIG. 1 in which a framework indicated generally at **10** supports a plurality of in-line stripping units indicated generally at **11**, **12**, **13**, **14**, **15** and **16**, all of which are of generally the same construction, subsequently to be described. The mechanism at each of the units is driven by a drive shaft **20** extending longitudinally of the machine and driven from a drive motor or a preceding machine previously operating on the blanks. A blank having sections thereof previously severed but still retained with the blank or partially severed as by a preceding die cut or rotary knife operation, is advanced to the machine with each blank being placed in timed relation to the stripping units by a timing mechanism indicated generally at **21**. The blank then advances through the stripping units to have sections of the blank removed from the blank remainder. Assuming a blank has six transverse rows of blank sections to be stripped from the blank, the blank will be advanced through the units **11** through **16** successively with the row of sections adjacent the rear edge of the blank being stripped at the unit **11** and the next succeeding row of blank sections being stripped at the unit **12** and so on until the remainder of the blank, commonly known as the "halo," passes out of the unit **16** and is carried by a driven conveyor **22** to a discharge plate **23**. Because of inherent selectivity, there need be no set pattern for blank section removal and the foregoing is only illustrative.

A first belt conveyor extending transversely beneath the units is indicated at **24** and with the assistance of guides **25** and **26** receives blank sections and conveys them from the machine. Successive blank sections removed at succeeding units **15** and **16** can be received on a belt conveyor **27** extending transversely of the machine. As herein used, the term "blank section" refers to scrap segments or parts thereof formed in the blank which would sometimes be removed at an early point in passage of the blank through the machine and also to the segment or segments of the blank to be further utilized for end product purposes. With this versatility, the conveyors provide for segregation of two or more different segments and also grouping in a desired relation.

The frame **10** has a pair of elongated, spaced-apart side plates supporting the stripping mechanism with one of these plates being shown at **30** in FIGS. 2 and 4 and the other plate **31** being shown in FIG. 5.

The mechanism for stripping blank sections from a blank at a stripping unit, such as unit **13**, as shown in FIGS. 2–5. The drive for the mechanism at the unit is obtained from a worm **32** on the drive shaft **20** engaging a worm wheel **33** on a transverse shaft **34** beneath the path of blanks supported by bearings on the side plates **30** and **31** and extending therebetween. A transverse cam shaft **35** located above the path of blanks is driven in timed relation with the shaft **34** through a sprocket chain **36** located outside of the side plate **31** and passing about a sprocket **37** secured to the shaft **34** and a sprocket **38** secured to the cam shaft **35**.

Means for feeding a blank through the stripping unit and specifically to and through knockout stations for deflecting blank sections from the remainder of the blank comprises a first, relatively wide, conveying belt **40** passing about a roller **41** secured to the shaft **34** and extending for substantially the entire distance between the frame side plates **30** and **31**. The belt also passes about a roller **42** having the same length as the roller **41** and secured to a shaft **43** mounted by bearings to the side plates **30** and **31** of the frame. The roller **41** is driven in a counterclockwise direction, as viewed in FIG. 5, whereby an upper reach **44** of the belt **40** receives a blank at the right-

hand end thereof, as viewed in FIG. 5, and the blank is advanced toward the left.

A second, relatively wide, belt 45 overlies and coacts with the belt 40 to positively advance a blank through the station. The belt 45 is mounted on a pair of rollers 46 and 47 secured to shafts 48 and 49, respectively, extending across the machine. The shaft 49 is rotatably and loosely mounted at each end in releasable holders 49*a* supported on the frame side plates and the shaft 48 is floatably mounted at its ends in a pair of mountings, one of which is shown in FIGS. 2 and 3. The mounting embodies an arm 50 having an end 51 journalled on the shaft 48 for the upper belt roller 46 and the other end 51*a* receiving the shaft 49. The belts 40 and 45 coact together to engage a blank therebetween for advance through the stripping unit and to the knockout stations subsequently to be described and the roller 47 may readily be removed to separate the belts to release a jam. Also the belts may accommodate different thicknesses of the blank. The upper belt is driven by a pair of gears 55 and 56 on the belt roller shafts 43 and 49.

Each stripping unit includes a plurality of knockout stations wherein the transverse row of blank sections or individual blank sections are deflected from the path of the blank remainder. These stations are immediately to the rear or to the left, as viewed in FIG. 5, of the upper conveying belt 45. A plurality of transversely spaced knockout devices 60 are located across the width of the machine and one at each station to effect the knockout of the blank sections. The knockout devices 60 are supported on a transverse rod 61 extending between a pair of upright side plates 62 and 63 secured to and extending upwardly from the frame side plates 30 and 31. Each device 60 has a mounting embodying a collar 64 movable lengthwise of the rod 61 and maintained in alignment therewith by a coacting key and keyway 65. A holding screw 66 holds the device in position lengthwise of the rod 61 whereby a plurality of the knockout devices 60 may be adjusted transversely of the apparatus to line up appropriately with the sections of the blank that are to be stripped from the blank.

The knockout device includes a finger 67 vertically movable in a guide bushing 68 of the finger mounting and at its upper end is pivotally connected, as indicated at 69, to a lever 70 which is pivoted at 71 to the finger mounting structure. The finger 67 has, at its lower end, a finger tip 72 removably secured thereto and the finger tip is formed of easily cut material whereby the finger tip can be contoured easily to a desired shape for obtaining the knockout action.

The finger 67 is normally urged to a retracted position shown at the left-hand side of FIG. 4 by a spring 73 (FIG. 5) extending between the finger mounting structure and the operating lever 70 for the finger. The retracted position of the finger 67 places the finger tip 72 at a level above the line of engagement between the conveying belts 40 and 45 which is the path of a blank whereby a blank is free to advance without interference from the finger tip. The finger tip 72 has a lowered position as shown at the right in FIG. 4 and also shown in FIG. 5 in which the tip has crossed the path of a blank to engage and deflect a blank section from the path of the blank. This action is obtained by a plurality of cams 75 located on the cam shaft 35 and associated one with each of the fingers 67.

Each of these cams is secured to a mounting hub 76 which is keyed to the cam shaft 35 and the cams are adjustable lengthwise of the cam shaft to permit alignment of the cams with their associated finger as the fingers are adjusted. A tightening screw 77 is provided to hold each of the cams in adjusted position. Each cam has one or more cam lugs 78 adjustably mounted about the periphery of the cam and held in adjusted position with respect to slots 79 by a tightening screw 80 to permit complete adjustment of the timing of actuation



of the fingers 67 relative to advance of a blank. A cam lug 78, during the rotation of the cam shaft, engages a cam follower roller 81 mounted on the finger operating lever 70 to operate a finger. After a cam lug 78 has passed by the follower 81, the spring 73 is free to return the finger 67 to its elevated position and the limit of upward movement of the finger is determined by pin 82 mounted in the finger which engages the under side of the guide bushing 68 for the finger.

The movement of the fingers 60 and specifically the finger tip 72 across the path of the blank results in deflecting a severed or partially severed blank section from the blank and the leading edge of the deflected blank section is directed into conveying means for conveying the blank section away from the blank. The severance of the blank section from the blank including the breaking of any tabs still connecting the parts together is accomplished by the conveying action. This conveying means embodies the lower conveying belt 40 as it passes about the roller 41 and a coacting nest of rollers 85, 86 and 87 which extend for the length of the lower belt roller 41 and which are floatingly mounted. The mounting for the nest of rollers is the same at each end thereof with the mounting being shown at one end in FIG. 4 and at the other end in FIG. 5. The rollers each have roller bearings at their ends which mount the rollers in a disk 88 having a reduced diameter extension 89 rotatably mounted in an arm 90 which is secured to a second arm 91 rotatable on the rod 61. The arm 91 is located lengthwise of the rod by a disk 92 secured to the rod 61. The rollers 85 and 86 are spaced apart from each other a slight distance and each is positioned to engage the lower conveyor belt 40 whereby each of the rollers rotate in a clockwise direction, as viewed in FIG. 5. As shown in FIG. 5, the rollers 85 and 86 rest direcly on the belt when no blank section is passing therethrough; however, when a blank section is deflected to the nip of the conveying means, the rollers 85 and 86 can move away from the belt 40 as permitted by the pivotal mounting of the arm 91 on the rod 61. The rollers 85 and 86 may adjust relative to the mounting arm 90 by rotation of the disk extension 89 in the arm. This adjustment is limited by a pin and slot connection 95 between the disk 88 and the arm 90. The floating mounting provided by the arm 91 enables the nest of rollers to be used with a lower belt roller 41 of a different diameter and the height of the nest of rollers may be adjusted by releasable adjusting screws 96 and 97 connecting the arms 90 and 91 to each other.

The nest of rollers includes the third roller 87 which rests on the rollers 85 and 86 and is caused to rotate in a counterclockwise direction. This roller contributes its weight to that of the other rollers in causing the floating mounting to press a blank section against the belt 40 for good conveying action and also assists in guiding a blank from one stripping unit to the next because the location of the upper surface of the roller 87 is approximately at the level of the path of blank travel for engagement with a blank and the rotation of this roller is in the same direction as the travel of the blank. The third roller 87 also engages a part of the blank immediately beyond the knockout stations to support the blank during the knockout of a blank section.

We claim:

1. Mechanism for stripping sections of a blank from the remainder thereof comprising, means for feeding a blank in a path through a knockout station, conveying means at said station for receiving a blank section deflected from the path of the blank, movable means located at the station movable across and at a generally right angle to the path of the blank in timed relation to blank movement along the path to engage and deflect a blank section to said conveying means, cam means for operating said movable means, motion multiplying means for transmitting movement from the cam means to the mov-

able means, said means for feeding a blank through the knockout station comprising a conveyor belt, and said conveying means includes said belt as it changes direction in passing about a pulley and a nest of floating rollers, one of said rollers engageable with the belt for rotation therewith and movable away therefrom for receiving a blank section therebetween, another of said rollers engageable with said one roller and resting thereon for rotation by said first roller and located for support of the remainder of the blank as it leaves the knockout station, said other roller being rotatated by said one roller in a direction to assist in moving the blank remainder.

2. Mechanism for stripping a blank section from the remainder of the blank comprising, means for feeding a blank in a path through a knockout station, means at said station for deflecting a section of the blank from the blank remainder, and means for receiving and conveying the blank section in a path diverging from the blank including, a belt traveling about a pulley, a nest of rollers adjacent the belt with at least one roller engaged with the belt, and means mounting the nest of rollers for floating adjustment relative to the belt to operate with different size pulleys and differing thicknesses of blank section.

3. Mechanism for stripping a blank section from the remainder of the blank comprising, means for feeding a blank in a path through a knockout station, means at said station for deflecting a section of the blank from the blank remainder, and means for receiving and conveying the blank section in a path diverging from the blank including, a first positively driven conveying element, a nest of rollers having at least one roller engageable with the first element for movement therewith, a second of said rollers engageable with the first roller for rotation thereby and located to support and assist in advance of the blank remainder from the knockout station and means mounting the nest of rollers for floating adjustment relative to the first element.

4. A blank stripping mechanism comprising, a relatively wide driven belt for supporting and feeding a blank with side-by-side severed sections to a plurality of transversely spaced knockout stations, a plurality of laterally adjustable knockout fingers located one at each of said stations, and means for conveying deflected blank sections from the knockout stations including a nest of rollers extending for the width of the belt with a pair of the rollers engageable with the belt, means mounting the nest of rollers for rotation as a group about a first



axis for alignment of said pair of rollers, and a pivoted member mounting the nest of rollers for adjustment about a second axis whereby the nest of rollers float and are caused to coact with the belt by their weight.

5. Mechanism for stripping sections of a blank from the remainder thereof comprising, means for feeding a blank in a path through a knockout station, transport means at said station for receiving a blank section deflected from the path of the blank and conveying said section away from the station, a finger located at said station and movable across said path to engage and deflect a blank section to said transport means, guide means for said finger movably guiding the finger in a substantially straight-line path across said blank path, a rotatable cam lug for imparting a quick blow to the finger, and means for multiplying the blow delivered to the finger including a lever pivoted at an end thereof and connected to said finger at the other end with a cam follower mounted intermediate the ends of the lever and selectively engageable by the cam lug.

6. Mechanism as defined in claim 5 in which a cam shaft mounts said cam lug, and means mounting the cam lug for circumferential adjustment about the cam shaft.

7. Mechanism as defined in claim 5 in which said finger has a replaceable blank engaging tip whereby a tip may be easily contoured to the desired blank engaging shape and associated with the finger.


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