Dec. 11, 1934. C. RUBLE ET AL 1,983,708

BOX BLANK MECHANISM

Filed Nov. 2, 1931 9 Sheets-Sheet 1

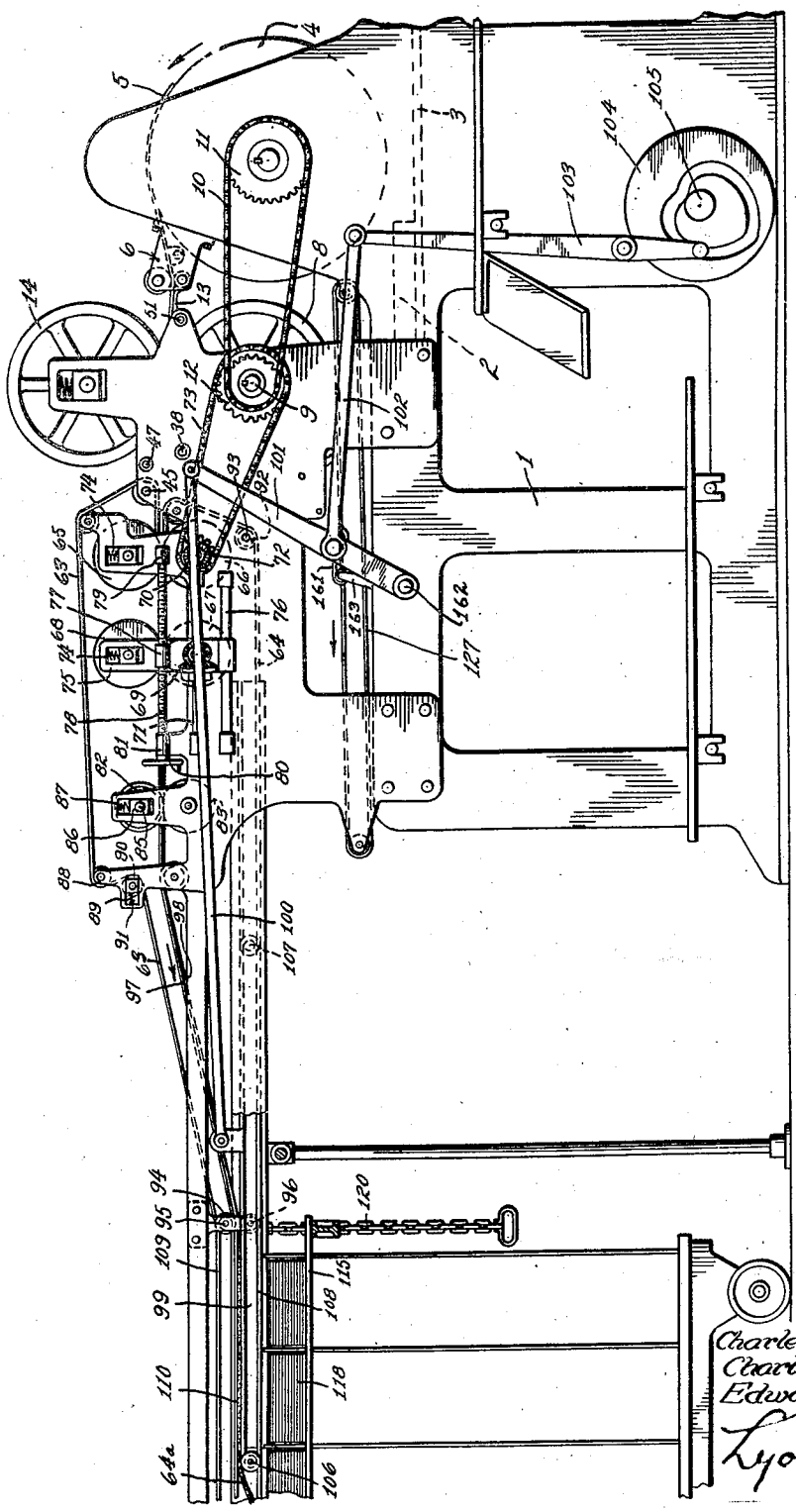

Fig. 1.

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BOX BLANK MECHANISM

Filed Nov. 2, 1931 9 Sheets-Sheet 2

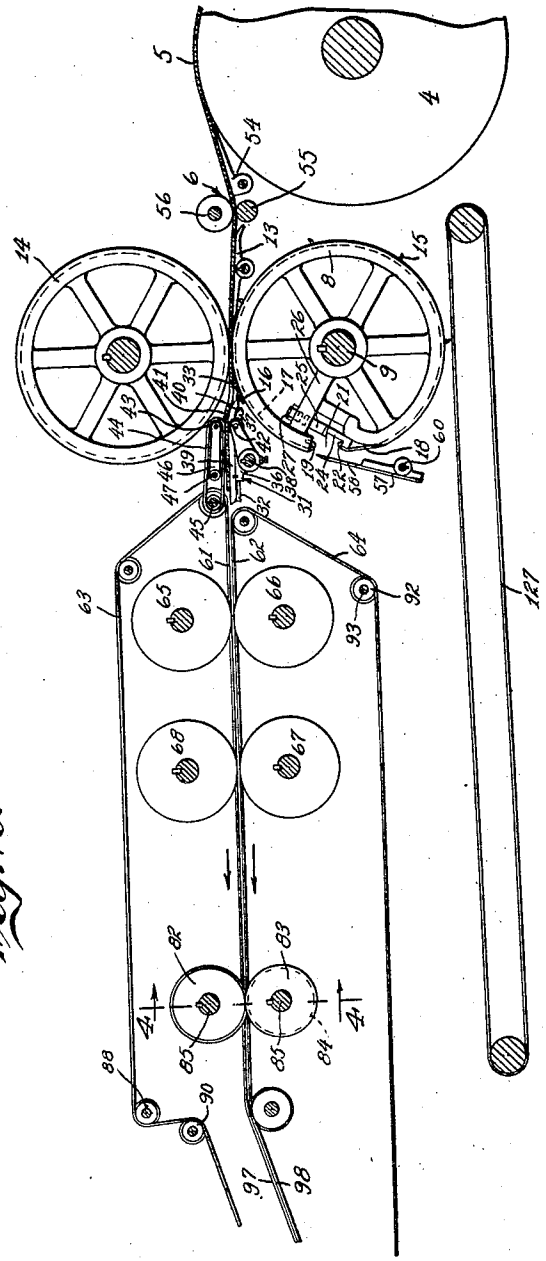

Fig. 2.

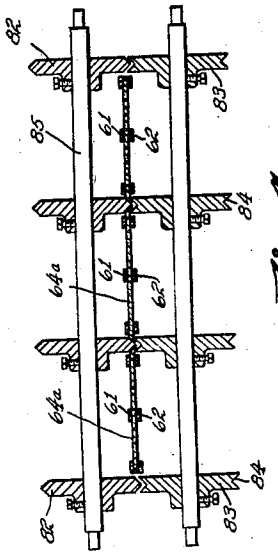

Fig. 4.

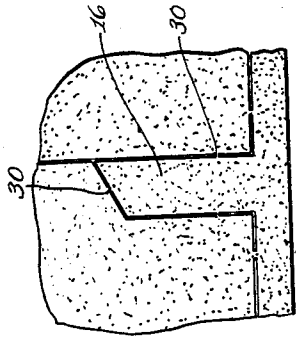

Fig. 3.

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BOX BLANK MECHANISM

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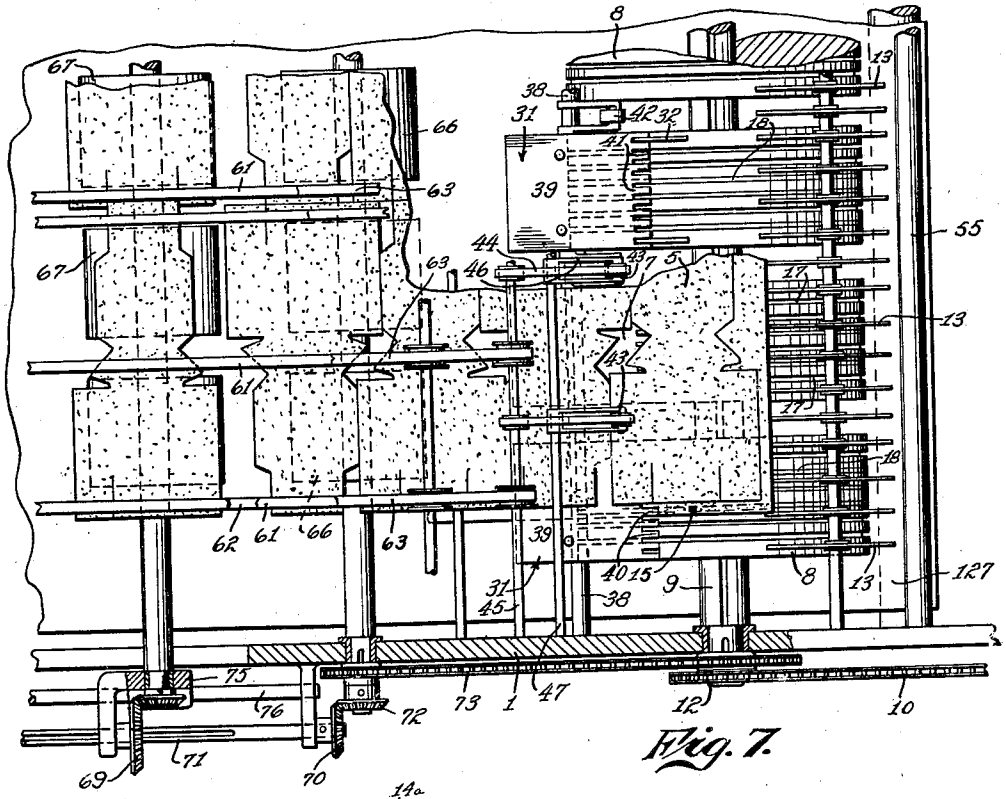

Fig. 7.

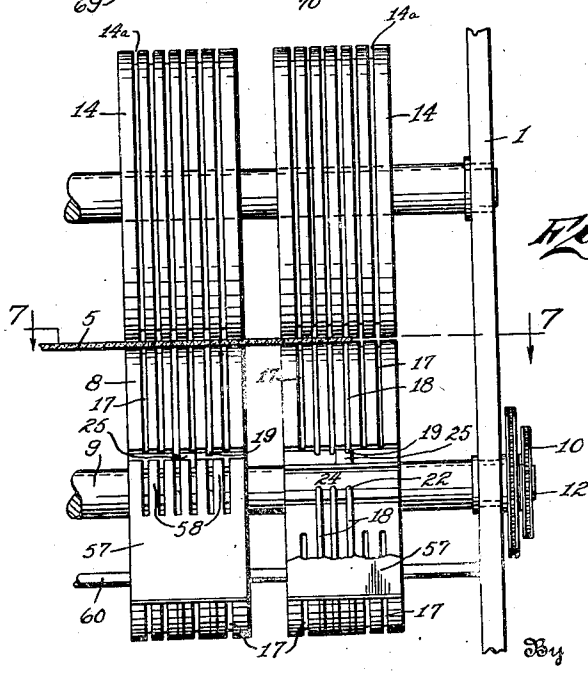

Fig. 6.

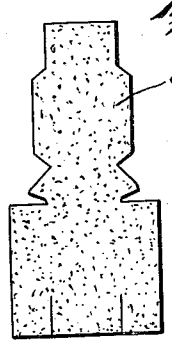

Fig. 5.

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BOX BLANK MECHANISM

Filed Nov. 2, 1931 9 Sheets-Sheet 4

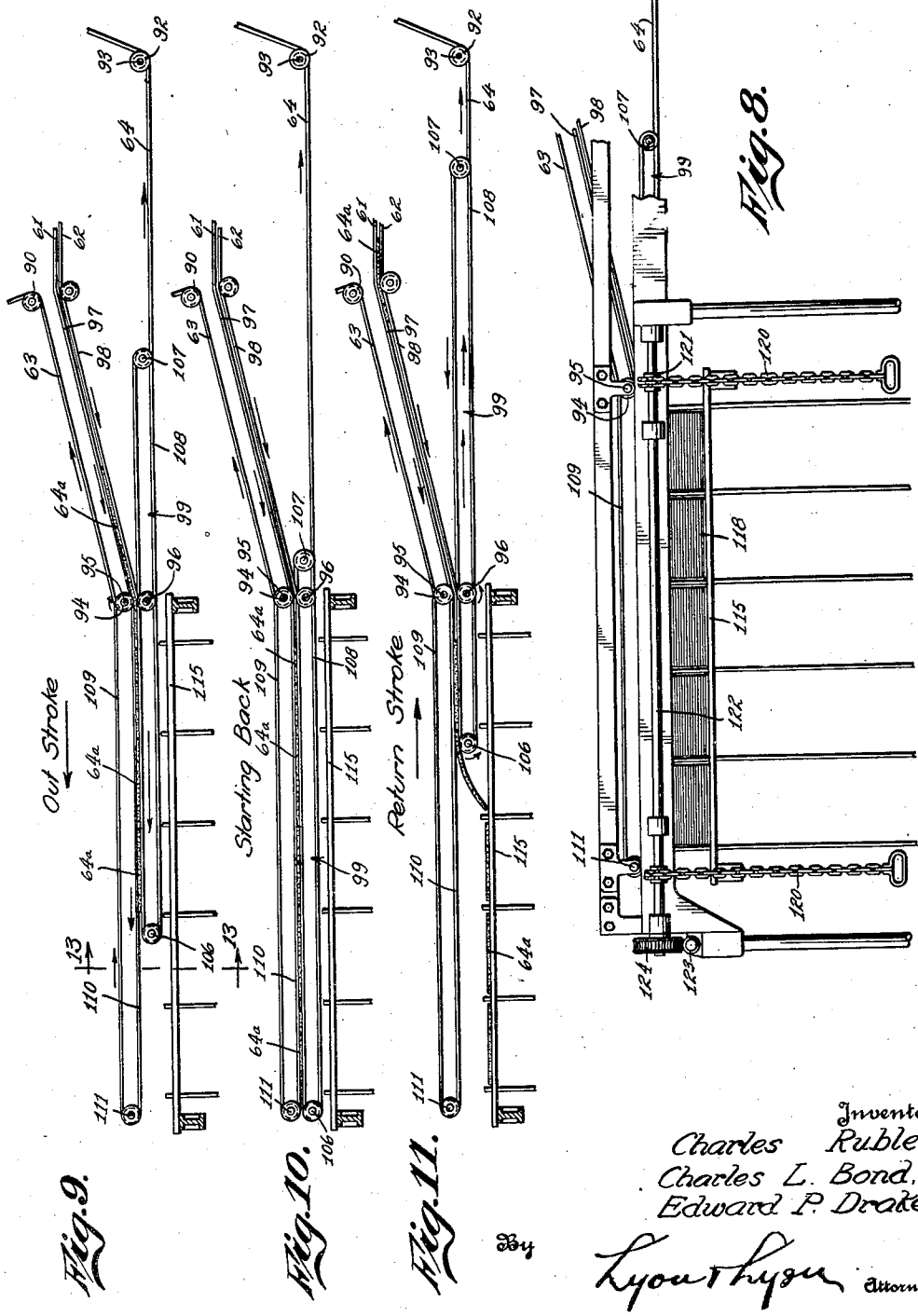

Fig. 9. Fig. 10. Fig. 11. Fig. 8.

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Dec. 11, 1934. C. RUBLE ET AL 1,983,708

BOX BLANK MECHANISM

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Fig. 12.

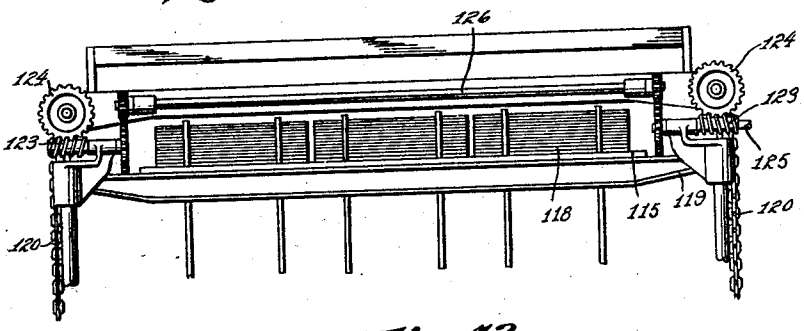


Fig. 13.

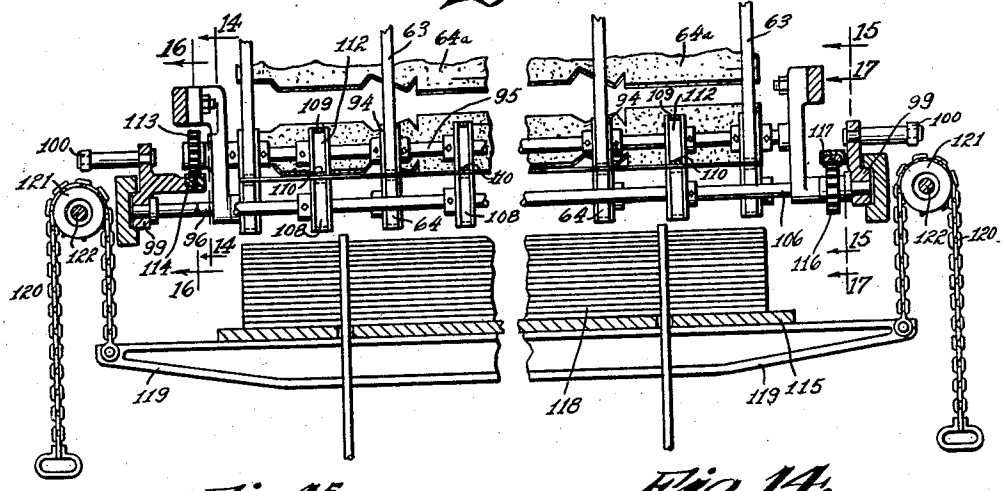


Fig. 15.

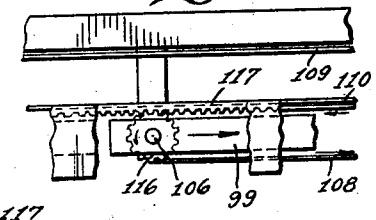
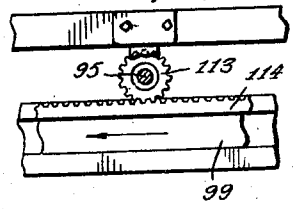


Fig. 14.



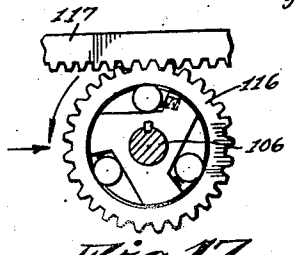


Fig. 17.

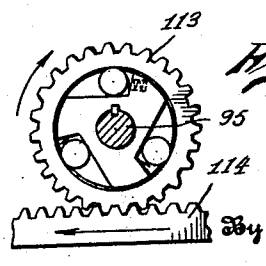


Fig. 16.

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BOX BLANK MECHANISM

Filed Nov. 2, 1931 9 Sheets-Sheet 6

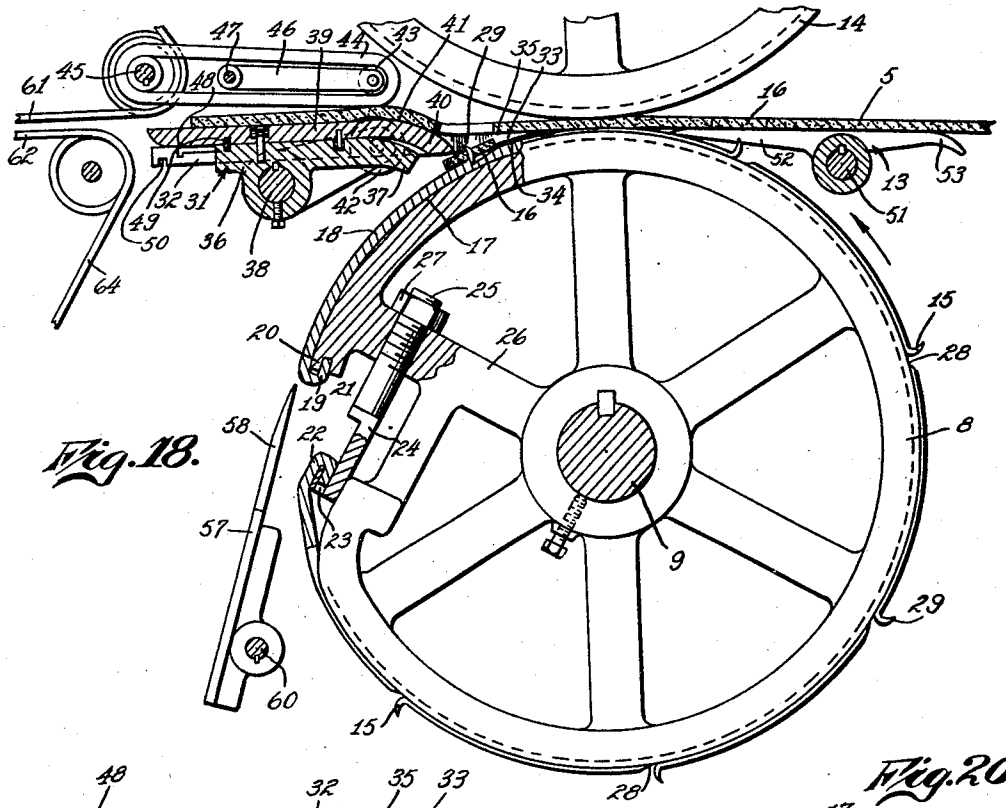


Fig. 18.

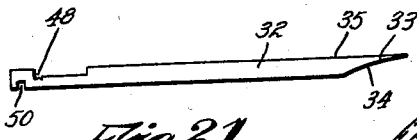


Fig. 21.

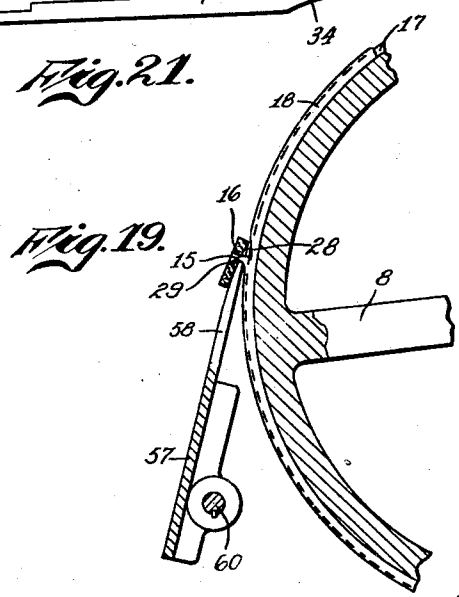
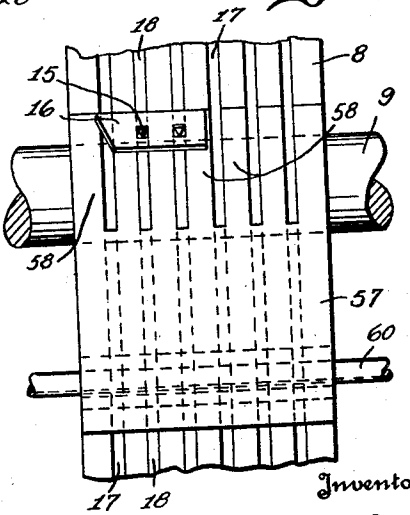


Fig. 19.

Fig. 20.



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BOX BLANK MECHANISM

Filed Nov. 2, 1931 9 Sheets-Sheet 7

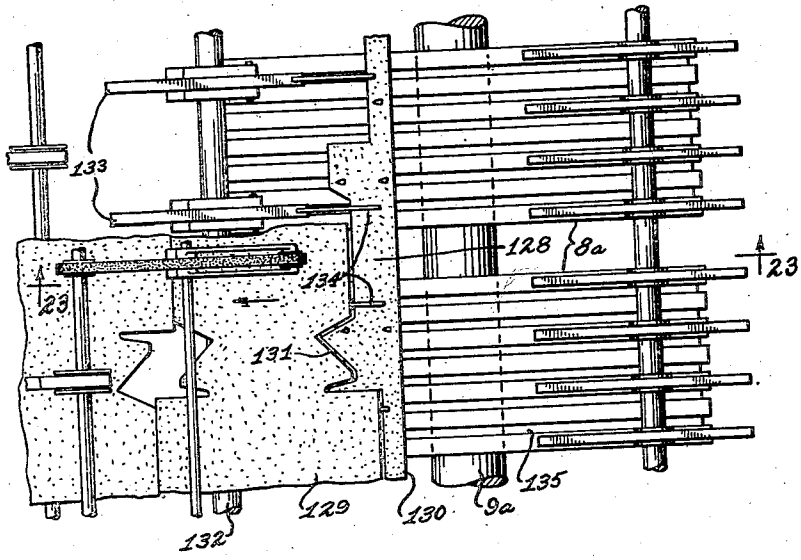
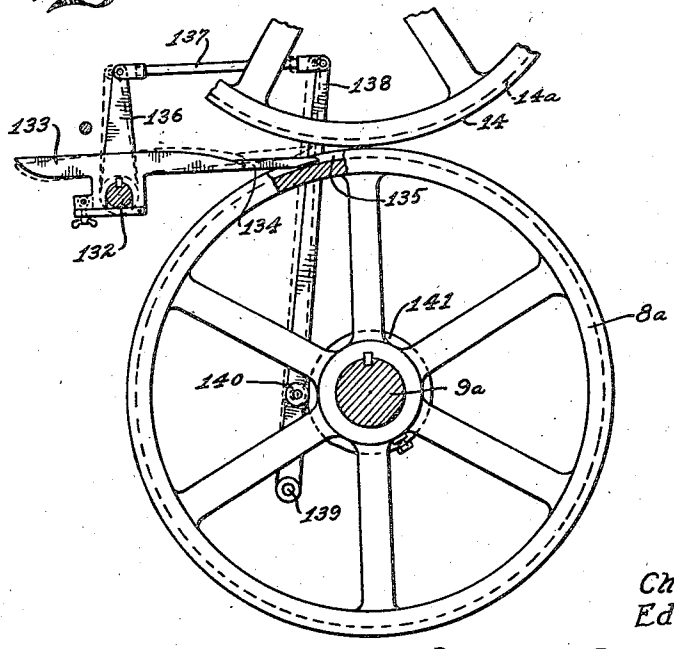


Fig. 22.

Fig. 23.



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BOX BLANK MECHANISM

Filed Nov. 2, 1931 9 Sheets-Sheet 8

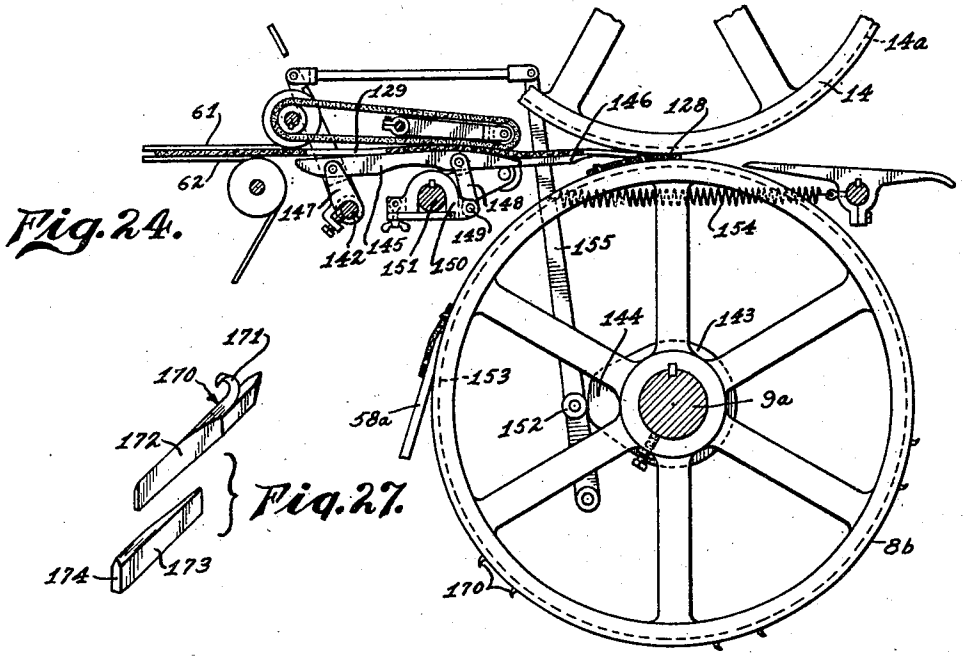


Fig. 24.

Fig. 27.

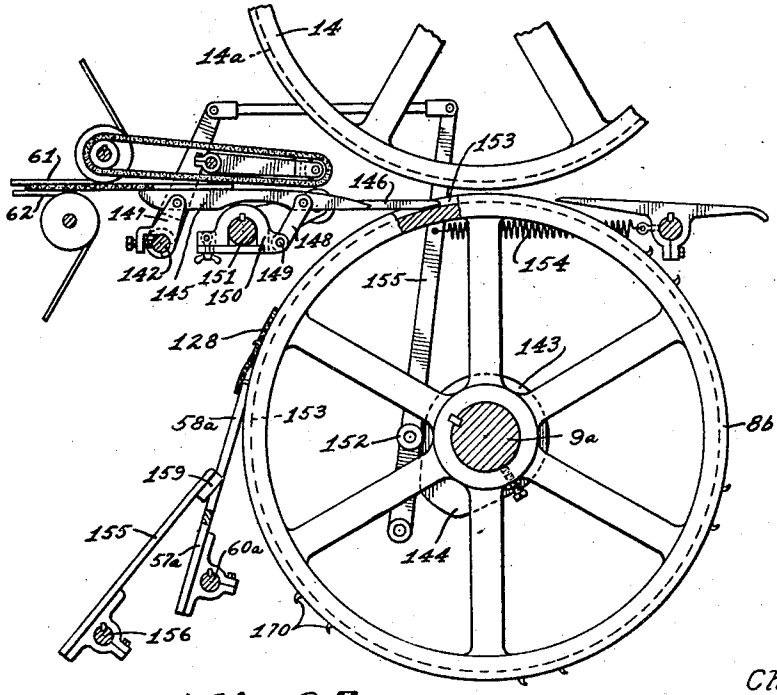
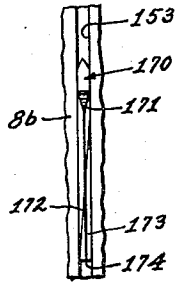


Fig. 25.

Fig. 26.



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Dec. 11, 1934. C. RUBLE ET AL 1,983,708

BOX BLANK MECHANISM

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Fig. 30.

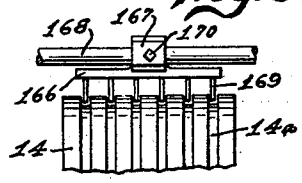

Fig. 29.

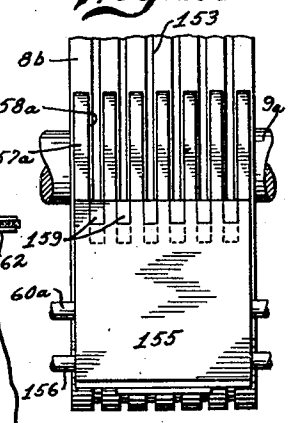

Fig. 28.

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Patented Dec. 11, 1934 1,983,708

UNITED STATES PATENT OFFICE

1,983,708

BOX BLANK MECHANISM

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Application November 2, 1931, Serial No. 572,493

42 Claims. (Cl. 93—58)

This invention relates to a machine for handling box blanks or cartons such as are made out of cardboard or similar material and which are capable of being folded up thereafter into box form; such blanks are usually formed by a machine in which a cylinder cooperates with a reciprocating die carrying plate. This invention concerns a machine for receiving the sheets carrying the blanks and adhering waste material as they come from the dies that cut the blanks.

In the present practice, the dies cut a number of blanks in a single sheet, each blank being adapted to form a complete box.

The dies do not completely cut the blanks out of the sheet, but leave small connecting tongues of the stock, and the sheet after being cut into the blanks also carries a considerable number of small irregularly shaped pieces of waste material or snips, and usually a transverse strip of waste occurs at the following edge of the sheet of blanks as it passes out of the machine.

It is now the practice to break the blanks out of the sheets by hand. This is a laborious operation and requires the continuous services of a considerable number of men corresponding to a modern machine of this type producing box blanks.

The general object of this invention is to provide a machine of this type with automatic means for removing the pieces of waste material; also to provide means for breaking the blanks apart automatically as they pass through the machine.

In machines for cutting such blanks, it is the present practice to provide a plurality of dies that are substantially alike and which cut a large number of blanks from the same sheet. There is a slight variation in the dies so that blanks for the same box will not register nicely with other blanks formed from other dies. In other words, the dies are not so accurate as to enable the blanks to be exactly the same. For this reason, it is desirable in a machine for accomplishing the objects outlined above to have means for laying all of the blanks formed from the same die in one pile and all of the blanks formed from every other die in a corresponding pile. One of the objects of our invention is to accomplish this.

In practice, there is a great variation in the size and shape of blanks, some of the blanks being quite small with very small pieces of waste material left in the sheet between the corners of the blanks. This fact considerably complicates the problem of providing for the removal of these waste pieces of snips.

One of the objects of our invention is to provide a machine of this type so constructed as to enable it to be used to effect the automatic removal of such waste snips although they may be relatively very small or relatively very large; in other words, to produce a machine which will have a great range of usefulness for performing its function, being substantially universal in its applicability to the removal of snips of various sizes and shapes.

In the preferred embodiment of our invention, the waste pieces or snips are removed through the agency of a rotary cylinder or drum which carries means for engaging the snips and removing same from the sheet as it passes the drum. One of the objects of the invention is to provide improved means for cooperating with this removing means to guide the cut sheet carrying the blanks as it passes from the drum or cylinder and to facilitate disengagement of the waste pieces from the sheet.

A further object of the invention is to provide improved means for mounting the pickers that remove the waste pieces or snips so as to enable them to be properly alined with the waste pieces, whatever may be their size or shape; also to provide pickers of simple form which can be readily secured so as to correspond with the location of the snips in any "job" that is being put through the machine.

In the preferred embodiment of the invention, stripper plates are employed for removing the waste pieces from pickers that pull them out of the sheets, and one of the objects of the invention is to provide means for automatically clearing the stripper plates of adhering waste.

At the rear edge of each sheet of blanks as it comes from the dies, there is a strip of waste material that extends all the way across the sheet. One of the objects of this invention is to provide means to facilitate the detachment of this entire strip from the sheet as it passes.

A further object of the invention is to provide an improved form of picker which will readily enable the pickers to be secured at any point desired on the rotary picker member, which operates to pull the waste pieces from the sheet.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce an efficient box blank mechanism.

A preferred embodiment of the invention is described in the following specification, while the

broad scope of the invention is pointed out in the appended claims.

In the drawings:

Figure 1 is a side elevation broken away illustrating the machine embodying our invention.

Figure 2 is a longitudinal vertical section taken substantially in the plane in which the sheets are fed forward through the machine, and particularly illustrating the parts that cooperate to effect the removal of the snips and the guiding of the sheet forward after the snips are removed. This view also illustrates the means for breaking the blanks up so as to separate them from each other for delivering them to the receiving table on which they are piled. This view is somewhat diagrammatic in nature, omitting unessential parts.

Figure 3 is a plan showing a portion of the edge of a sheet and indicating the way the blanks are cut in the sheet, forming waste material or snips between the blanks.

Figure 4 is a vertical section taken about on the line 4—4 of Figure 2, of a diagrammatic nature and particularly illustrating details of the breaker rolls that break the blanks apart on lines extending longitudinally with the direction of feed.

Figure 5 is a plan illustrating the general character of a blank such as may be formed on a machine of this kind.

Figure 6 is a vertical section taken through one of the sheets as it is passing from the breaker roll and should be read in connection with Figure 19. Parts of Figure 6 are broken away.

Figure 7 is a horizontal section taken about on the line 7—7 of Figure 6 just above the location of the path along which the sheets are fed, certain parts being broken away. This view particularly illustrates the means for guiding the sheets and the blanks.

Figure 8 is a side elevation of the outer end of the machine at which the blanks are delivered and should be read in connection with Figure 1, certain parts being broken away.

Figure 9 is a diagrammatic view corresponding to Figure 8 and illustrating graphically by the use of arrows the belt movements which take place when the carriage is making its out stroke and carrying the separated blanks, certain parts being broken away.

Figure 10 is a view similar to Figure 9 but showing the carriage at the end of its out stroke and about to start the return stroke.

Figure 11 is a view similar to Figures 9 and 10 but illustrating belt movements which take place during the return movement of the carriage which enable the carriage to lay the blanks at different points on the receiving table.

Figure 12 is an end elevation of the machine, certain parts being omitted and broken away. This view may be regarded as an end elevation of the parts shown in Figure 8, and particularly illustrates the manner in which the machine operates to lay the blanks in corresponding piles.

Figure 13 is a vertical section taken through the machine at about the point 13—13 of Figure 9 and particularly illustrating the belt pulleys and their shafts for the supporting belts and presser belts that cooperate with the carriage to deliver the blanks. This view also illustrates the automatic means for stopping the movement of these belts periodically.

Figure 14 is a section taken about on the line 14—14 of Figure 13, certain parts being omitted and broken away, further illustrating the means for driving the shaft that carries the presser belts.

Figure 15 is a vertical section taken about on the line 15—15 of Figure 13, certain parts being broken away and further illustrating the drive for the driving shaft of the supporting belts of the carriage.

Figure 16 is a vertical section about on the line 16—16 of Figure 13 illustrating a one-way drive connection which enables the presser belt shaft to remain stationary in one stroke of the carriage.

Figure 17 is a vertical section taken on the line 17—17 of Figure 13 and illustrating a one-way drive connection used at this point for enabling the supporting belts of the carriage to be stationary on one stroke of the carriage.

Figure 18 is a vertical section upon an enlarged scale in the feeding direction located at the picker drum and particularly illustrating the pickers and the means cooperating with the same to effect the disengagement of the snips from the sheet as it passes the drum.

Figure 19 is a small sectional view taken in the same plane as Figure 18 and particularly illustrating the operation of the snip strippers in stripping the snips from the pickers.

Figure 20 is a front elevation of a portion of the picker drum and illustrating a snip caught on a pair of pickers.

Figure 21 is a side elevation of one of the finger bars which form a part of the guiding means for supporting the sheets to guide them while the pickers are removing the snips.

Figure 22 is a plan view similar to Figure 7, illustrating a type of guide means for guiding the sheet from the picker member, or drum, and which is controlled to enable the waste strip at the rear edge of the sheet to pass under the guiding means when it is detached from the sheet by the pickers; in this view, a portion of the sheet with the waste strip is shown broken away, and other parts in the view are shown broken away;

Figure 23, is a vertical section taken about on the line 23—23 of Figure 22, with certain parts broken away, and illustrating (in full lines) the guiding means in its normal position for guiding the sheet from the rotary picker member, and illustrating the guiding means in dotted lines in a displaced position at the moment the trailing edge or waste strip of the sheet is passing;

Figure 24 is a view similar to Figure 23, but illustrating another embodiment of the means for mounting the guide or guiding means, and in which the displacement of the guiding means is accomplished not by rotation on an axis as in Figure 23, but by bodily shifting the guide to clear the waste strip and enable it to pass. This view shows the guide in its shifted position displaced from the picker drum, that is to say, the position illustrated is not the normal position for the guide;

Figure 25 is a view similar to Figure 24, but showing the guide in its normal position; this view also illustrates an automatic wiper for wiping the stripper plate which strips the waste pieces from the rotary picker member;

Figure 26 is a detailed view showing a short portion of the face of the picker and illustrating an improved type of picker which we employ with means for enabling it to be secured at any point on the periphery of the rotary picker member;

Figure 27 is a perspective of a picker removed from the picker drum and illustrating a locking wedge which cooperates with a portion of the

picker body to lock or wedge it at any position in the picker channel or slot;

Figure 28 is a view similar to Figure 25, but looking from the opposite side of the machine, and this view further illustrates the automatic wiper for the stripper plate, and in full lines illustrates the stripper plate in its wiping position; this view also illustrates the mechanism for actuating the wiper of the stripper plate and also illustrates cleaners or wipers for cleaning the channels or slots of the picker drum that carry the pickers;

Figure 29 is an elevation showing the stripper plate and a portion of the picker drum as viewed from the right side of Figure 28, the drum shaft and the rock shafts for the stripper plate and wiper being broken away;

Figure 30 is a side elevation of the upper side of the picker drum as illustrated in Figure 28, and further illustrating details of the cleaner comb for clearing the picker channels of waste material; this view shows the supporting bar for the picker comb broken away.

Before proceeding to a detailed description of the invention, it should be stated that the machine to which the invention has been applied includes in its construction a rotary cylinder which cooperates with a die plate that reciprocates on the underside of the cylinder and cooperates with the cylinder to cut the sheet into a plurality of blanks. These blanks, however, are not completely severed from the sheet, but are connected to each other and to the body of the sheet by small tongues of the stock. The blanks, however, are located close together, being separated in general merely by the width of the cutting knife of the die.

According to our invention, we take the sheet from this cylinder and pass it through mechanism which operates automatically to remove the waste pieces or snips between the blanks. Further along the path of movement of the sheet, the blanks are pulled apart in the feeding direction, that is to say, they are separated on lines extending transverse to the feeding direction. The blanks are also advanced past longitudinal breakers that separate the blanks on lines extending longitudinally with the feeding direction.

The blanks are then handled by the machine without disturbing their relation to each other and they are advanced substantially as though they constituted a complete sheet and are then laid on a receiving table automatically so that all the blanks cut from the same die are piled in the same place.

Referring more particularly to the parts, and especially to Figures 1 and 8, 1 represents the frame of the machine which is elongated to carry the mechanism of the machine and provided at its head end with a die plate 2 that is guided to reciprocate on a suitable supporting guide indicated by the lines 3, thereby passing under the lower face of a female die or impression cylinder 4 to cut each sheet of stock into the blanks. The feeding mechanism for feeding the sheets between the die 2 and the cylinder 4 is not illustrated.

In Figure 1, 5 indicates a sheet extending over the upper side of the die cylinder 4 which is passing through feeding mechanism 6 of any suitable construction which directs the sheet through the picker mechanism, the function of which is to remove the snips or small pieces of waste material between the blanks. In this connection, reference is had to Figure 7 in which the numeral 7 indicates a space left in the sheet by the removal of a snip.

These snips are sometimes very small, and furtheremore, they may occur at any point on the width of the sheet, and for this reason the picker means must be adapted for location at any point across the width of the sheet, and furthermore, the picker devices, or spurs, that catch the snips to pull them out of the sheet, must be located so that they have a timed relation with respect to the drum or cylinder 4. In order to accomplish this, the picking mechanism preferably includes a plurality of complementary rotary members including picker drums such as the drum 8. These drums virtually constitute sections of a long drum but are made in sections so as to facilitate their being adjusted longitudinally of the drum shaft 9 when desired. They are all splined to the drum shaft, and the timed relation between the rotation of the drum shaft 9 and the cylinder 4 is attained by providing a chain drive including an endless chain 10 passing around sprocket wheels 11 and 12, the latter of which is half the diameter of the former. In other words, we provide a drive between the cylinder 4 and the shaft 9 which will insure a certain synchronism between the picker drums 8 and the cylinder. However, in this connection it should be understood that if the sheets had already been cut in a blanking machine they could be fed through our picker mechanism by any desired automatic feeding device known to the art which would operate to feed the sheet into the picking mechanism in a predetermined timed relation to the picker drums so as to insure that the pickers would properly strike the snips between the blanks.

Referring now particularly to Figures 2 and 18, as the sheet 5 passes through the feed mechanism 6 it passes across a suitable guide bridge 13 which delivers the sheet between the picker drum 8 and a complementary grooved presser drum or roller 14 that is substantially tangent to drum 8, that is to say, it rolls on the upper face of the picker drum. The picker drum is provided with a plurality of means such as spurs 15 which are positioned at the proper points on the drum to remove the waste material such as the snip 16 (see Figure 3). The spurs align with the grooves 14a of the roller 14.

In order to accomplish this and enable the spurs to be placed very close together measuring longitudinally on the face of the drum, we prefer to construct drum 8 with a plurality of circumferential grooves 17, and in these grooves wherever necessary we attach a picker 18. Each picker consists preferably of a curved bar of very small cross section to fit in its groove 17, and each picker is secured rigidly in its groove in the drum. This is preferably accomplished by anchoring one end of each picker by means of a hook 19 on its end that engages in a longitudinal flange 20 formed in a gap 21 on the face of the drum. The other ends of the pickers are provided with similar hooks 22 that engage into corresponding slots 23 in a tension bar 24 located in the gap 21, and the drum is provided with means for rigidly securing this tension bar. This means preferably includes a pair of adjusting bolts 25 mounted in a spoke 26 of the drum and provided with a nut 27 on each stud for clamping up all of the pickers simultaneously.

In one embodiment of the invention, each picker is formed of a steel bar, and each picker spur 15 is formed by cutting a notch 28 in the outer face of the bar in an inclined direction and then bending the material at the notch outwardly and forwardly to form a forwardly curv-

ing hook having a sharp point 29 disposed forwardly with respect to the direction of rotation of the drum. Before placing these notches 28 in the pickers, a layout is made of the sheet and blanks so as to ascertain how far apart circumferentially these picker spurs 15 should be.

Referring to Figure 18, when the sheet 5 passes over the drum 8, each spur 15 imbeds itself in a corresponding snip 16, and as the drum continues its rotation, the spur hooks the snip out of the sheet. In doing so, it breaks the small tongues 30 of stock that connect the snip to the adjoining blanks (see Figure 3).

In order to prevent the spurs from pulling the sheet down around the side of the rotating drum, we provide suitable guiding means 31, and this guiding means preferably includes a plurality of long finger bars 32 which are relatively thin and which have tapered points 33 capable of passing well up on the upper face of the drum nearly to the point of tangency of the drum with the sheet 5; in other words, referring to Figure 21, each finger bar has a concave lower and forward edge 34 that fits in close to the face of the drum, and the upper edge 35 of each finger bar is located in line with the under face of the sheet 5 so that they will guide the sheet in a substantially horizontal line as it leaves the drum. The spaces between the bars 32 provide clearance for the spurs 15 as they pass the bars.

It is necessary, however, to support the finger bars 32 rigidly as near as possible to the upper face of the drum 8. For this purpose, we provide a bridge 36 in the form of a substantially horizontal plate with a downwardly bent forward end 37, and this plate on its underside is secured to a transverse shaft 38 that may be rotated adjustably so as to tip the finger bars 32 up or down to adjust them to the face of the drum. The finger bars are preferably clamped between the body plate 36 and a removable cover plate 39 that conforms in general contour to the body plate 36 except that it extends somewhat nearer to the face of the drum at which point it presents a slotted downwardly bent forward edge 40 that lies quite near to the spurs 15 as they pass it. The upper side of this cover plate presents a convex guide face 41 that is engaged by the sheet 5 as it comes forward.

We prefer to provide positive guiding means at this point for advancing the sheet and for this purpose we provide the guide means with a plurality of small rollers 42 which are mounted to rotate on a horizontal axis and so that their upper faces project slightly above the convex face 41. If desired these rollers may be driven but we prefer to simply permit them to cooperate with feeding means located above the guide and including a roller 43 which may carry an endless belt 44, the underside of which engages the upper side of the sheet.

This belt is driven by means of a driven shaft 45 mounted in a fixed position in the frame, but the roller 43 is adjustable up or down by reason of the fact that it is carried on arms 46 attached to a fixed cross-shaft 47 mounted in the space between the upper and lower runs of the belt. This shaft 47 may be clamped in any adjusted position to adapt the feed belt 44 to different thicknesses of sheet, and also to regulate the pressure of the belt on the sheet as it passes over the rollers 42 and over the guide plate 39.

Referring again to the details of the finger bars, each finger bar is provided near its rear end with a deep notch 48 which, when the finger bar is mounted in its advanced position, engages with a transverse batten or lock bar 49. This batten 49 holds all of the advanced finger bars in position. In order to facilitate withdrawal of the bars when necessary, their under sides may be provided with notches 50 respectively.

Referring again to the guide 13. This guide is in the form of a grid with finger bars 52 projecting toward the upper face of the drum. The spaces between the finger bars 52 permit the spurs 15 to pass up (see Figure 18). This guide is mounted on a transverse shaft 51 which is preferably constructed so as to be adjustable on its axis to adjust the tips of the finger bars 52 with reference to the face of the drum. On the outer side of the guide 13 it is provided with downwardly curved finger bars 53 that take the sheet 5 on their upper sides and assist in guiding the sheet between the drum 8 and the roller 14. By having these finger bars 53 turned downwardly at their tips, the feeding action of the feeding mechanism 6 is greatly facilitated. The feeding mechanism 6 may also include a stripper 54 that strips the sheet 5 off of the cylinder 4, and guide rollers 55 and 56 may be provided between this stripper and the guide 13.

Referring again to Figure 18, after the snip 16 is pulled out of the sheet 5, it passes down with the spur on the left side of the drum as viewed in this figure and is carried past a stripper plate 57. This stripper plate is in the form of a comb with a plurality of teeth 58 which are pointed at their upper ends and this comb is disposed in inclined position as indicated in Figure 18. The action of the comb is illustrated in Figure 19. In this connection it should be understood that as the teeth of the comb engage the snip, the spur 15 passes in the space between the adjacent teeth, thereby removing the snip. This stripper is preferably mounted for slight rocking adjustment on a cross bar or shaft 60.

The sheet 5, after passing the picker drum, is delivered by the endless belt 44 between runs 61 and 62 of belts 63 and 64. The runs 62 support the sheets and the runs 61 of the upper belts 63 hold the sheets in place and guide them through the breaker mechanism that breaks the blanks apart. These blanks may have any shape, for example, such as that of the blank 64*a* (see Figure 5). In this connection it should of course be understood that the cuts between the blanks are formed in the sheet either longitudinally with the feeding direction or transverse to the feeding direction. The breaker mechanism operates to break the blanks apart along both of these lines.

Referring to Figures 1 and 2, the sheet 5 passes between two cooperating pairs of breaker rolls that subject the sheet to a slight tension, thereby pulling the blanks apart on lines transverse to the feeding direction.

Referring to Figure 2, 65 and 66 constitute the first set of rolls, and 67 and 68 constitute the second set. These rolls have grooves in their faces to permit the belts 63 and 64 to pass through. The rolls 67 and 68 are driven at a slightly higher speed than the rolls 65 and 66 through the medium of a relatively large driving bevel gear 69 as compared with a corresponding smaller bevel gear 70 (see Figure 1).

The bevel gear 69 is splined on its drive shaft 71 and the small bevel gear 70 is driven from the bevel gear 72, which in turn is driven by an endless chain 73 off of the drum shaft 9. The upper rollers 65 and 68 should be of rather light weight and pressed downwardly by coil springs 74 which

press downwardly on the box for their journals (see Figure 1). By reason of the increased peripheral speed of the rollers 67 and 68, each sheet is subjected to a slight tension which operates to pull the forward blanks away from the rear blanks as they pass between the rollers.

In order to adapt these pairs of rollers to cooperate properly with blanks of different width, we prefer to mount them so that they can be adjusted toward or from each other. For this purpose the rollers 67 and 68 are mounted in an adjustable carriage 75, the ends of which are guided along horizontal guide bars 76 on the frame, and this carriage has a threaded sleeve 77 operating as a nut on an adjusting screw 78 having a swivel connection at 79 on the frame, and having a hand-wheel 80 at its outer supporting bearing 81 for rotating it. When rotated as suggested, of course the pinion 69, which is housed in this carriage 75, slides along with the carriage.

Referring to Figure 2, when the blanks separated by the breaker rolls 65 to 68 pass on, they pass between longitudinal breaker rolls 82 and 83 (see Figure 4), which break the blanks along lines longitudinal with the direction of feed. These rollers are preferably in the form of cooperating discs. The upper discs 82 have V-shaped breaking edges which are received in a V-shaped groove 84 in the opposite disc. The breaking action is clearly illustrated in Figure 4. These discs are adjustably mounted on their shafts to enable them to be aligned with the lines of cut between the blanks.

These discs 82 are carried upon a common shaft 85, and the discs 83 are similarly mounted on the corresponding shaft. It is unnecessary to drive these discs, but if desired, they may be driven. Furthermore, if desired, the shaft 85 may be mounted in boxes 86 guided vertically in the frame 1 and pressed downwardly by springs 87. However, the weight of the shaft 85 and the discs 82 alone would probably be sufficient to insure the breaking of the blanks apart, but the springs 87 would be necessary where the stock is unusually heavy.

The guide belts 63 and 64 are preferably continuously driven in a forward direction, as indicated by the arrows in Figure 2. For this purpose they may be passed around guide pulleys 88 which may be arranged substantially as shown. These guide pulleys preferably include a tension device 89, (Fig. 1) including a tension pulley 90 which is pressed by a spring 91 in a direction to keep the upper belt taut. If desired, a similar tension device may be used on the lower belts 64, or if desired, the pulleys 92 for these belts may be mounted on a shaft 93, the ends of which are adjustable downwardly where they are supported in the main frame 1.

The outer ends of the endless belts 63 and 64 converge toward each other as indicated clearly in Figures 9 to 11. In this way each upper belt 63 forms an extension with a loop running around a loose pulley 94 on a cross shaft 95 (see Figure 13), and the lower belt 64 forms an extension with a loop running around corresponding pulleys on a shaft 96, (Fig. 1). These two shafts 95 and 96 are located one above the other and close together so that the two sets of belts 63 and 64 present runs 97 and 98, respectively, that advance in the direction indicated by the arrows in Figures 9 to 11. In this way the separated blanks 64a are fed in an inclined direction downwardly to a point between the shafts 95 and 96, at which point they are delivered to a reciprocating carriage 99. This carriage is reciprocated in a timed relation in the machine through the agency of a connecting rod 100 (see Figure 1) driven by a lever 101 pivotally mounted on the side of the frame and actuated through the agency of a connecting rod 102, cam lever 103 and a cam 104 on a cam shaft 105. This carriage 99 carries two transverse shafts 106 and 107, the former of which is at the forward end of the carriage, and the latter of which is at the rear end. These shafts 106 and 107 carry endless belts 108 that run around guide pulleys on the shafts, and the upper run of these carriage belts support the under sides of the blanks as they advance (see Figure 9).

On the out-stroke of the carriage, as illustrated in Figure 9, the belts 108 are stationary, enabling them to advance as though they were fixed on the carriage. In this way the blanks are laid on the upper sides of the supporting belts 108, being slightly separated from each other in the feeding direction (see Figure 9).

In order to hold the blanks down on the supporting belts 108 as the carriage advances, this type of machine is provided with presser belts 109. These presser belts have lower runs 110 which engage the upper sides of the blanks and advance at the same speed as the blanks when the carriage is making its out-stroke. The outer ends of these belts 109 are guided around suitable loose pulleys on a fixed shaft 111. Means is provided for driving the belts 109 in this direction on the out-stroke. For this purpose their inner ends pass around pulleys 112 (see Figure 13), which are rigidly attached to the shaft 95. The end of the shaft 95, which is supported in the frame 1, is provided with a pinion 113 (see Figure 13), and this pinion meshes with a rack 114 on the carriage. On this account, as the carriage moves outwardly, the shaft 95 will be rotated in the direction indicated by the arrow in Figure 9, that is to say, in a clock-wise direction. This will drive the belts 109 in the desired direction, and at the same speed as the carriage.

On the return stroke of the carriage the rack does not rotate the shaft 95 by reason of a one-way drive connection in the pinion 113 (see Figure 16).

Figure 10 shows the carriage at the end of its out-stroke starting back. As the carriage starts back in its return stroke, the carriage belts 108 are driven in the direction of the arrow as indicated in Figure 11; that is to say, they are driven in an outward direction or toward the delivery end of the machine, and they are driven at the speed of the carriage, so that although the carriage is moving, they substantially are stationary. The result of this is that the blanks will be laid down in succession on a receiving table 115 (see Figure 11).

The carriage belts 108 are given this movement through the agency of shaft 106 (see Figure 13), that carries a pinion 116 meshing at its upper side with a fixed rack 117. With this construction it will be evident that as the carriage moves along on its return stroke, the shaft 106 will be given an anti-clock-wise movement as indicated by the arrow in Figure 11. On the outstroke of the carriage this rotation will not occur, and the carriage belts will remain stationary as though fixed to the carriage. This is effected by

utilizing a one-way drive connection (see Figure 17), which is built into the pinion 16.

The receiving tables 115 in machines of this type are mounted so that they gradually descend and the blanks are received on the table in piles such as the piles 118 (see Figure 12).

For this purpose the ends of the frame 119 that supports the table 115 may be supported on chains 120 running over sprocket wheels 121 carried on feed shafts 122. These two feed shafts may be rotated automatically through the agency of a worm 123 and corresponding worm wheel 124 for each feed shaft. The shaft 125 of one of the worms may be continuously driven, and a cross driving connection employed involving a cross shaft 126 (see Figure 12) to drive the opposite worm, suitable gearing being employed as illustrated for driving the cross shaft.

In order to carry off and collect the snips which are stripped from the spurs 15 by their strippers, we prefer to provide an endless conveyor belt 127 mounted in the machine (see Figure 1) at a suitable point under the drum 8. This conveyor belt should be driven in the direction indicated by the arrow by suitable means not illustrated.

The picker and picker mechanism described above will operate effectively to disengage small pieces or snips of waste material joining the box blanks. In practice, however, the blanks may not completely fill the sheet so that the rear edge of the last blank with respect to the direction of feed will coincide with the rear edge of the sheet. For this reason, there is usually a waste strip 128 (see Figure 22) that adjoins the blanks such as the blank 129, which is adjacent to the falling or rear edge 130 of the sheet as it passes through the machine in the direction of the arrow. When such a waste strip occurs, its forward edge or outline 131 is irregular and in this forward edge has a tendency to become caught in the tapered forward ends or points 33 of the finger bars 32 (see Figure 18). For this reason, in machines operating on sheets that have a waste strip such as strip 128, we prefer to provide means for shifting the finger bars away from the face of the rotary picker member or drum just before the strip arrives at the finger bars. In this way, the finger bars break the last blank away from the strip by moving it upwardly and provide clearance for the waste strip to pass by while held on the pickers. In order to do this, we prefer to mount the guide means or guides for the sheet so that the finger bars may be raised bodily upward or rocked on an axis so as to displace them from the face of the picker drum.

Referring particularly to Figures 22 and 23, 8*a* indicates a picker drum, and nearly at the level of the upper face of this drum, we provide a rock shaft 132 that carries a plurality of guide means preferably in the form of guide bars 133, each guide bar carrying a finger bar 134 that projects from its forward edge so that it is normally received in one of the channels or slots 135 on the picker drum. At one end of this shaft and toward one side of the machine, we provide the rock shaft 132 with a rigid arm 136 for rocking the shaft in a timed relation with respect to the drum shaft 9*a*. This arm is actuated at the proper instant by a link 137 connected to a cam lever 138 mounted on a pivot pin 139 on the frame of the machine and having a roller 140 that runs on the cam 141 on the shaft 9*a*. Just before the strip 128 arrives at the finger bars, the cam 141 will rock the cam lever 138 toward the left and thereby rock the shaft 132 to raise the finger bars 134 as indicated by the dotted lines in Figure 23. This displaces the finger bars sufficiently from the drum to permit the stripper 128 impaled on the picker spurs to pass by.

In Figures 24 and 25, we illustrate another embodiment of this lifting mechanism for the finger bars in which the finger bars are raised by "parallel" movement; in other words, the entire guide is raised away from the drum instead of merely rocking the tips of the finger bars away from it. In this embodiment of the invention, we provide a rock shaft 142 corresponding to the rock shaft 132, and we operate this rock shaft as illustrated in Figure 24 by means substantially the same as that indicated in Figure 23. In this case, a greater amount of movement is necessary so that the cam 143 on the shaft 9*a* has a very pronounced lifting toe 154. The rear end of the guide 145 that carries the finger bars 146 is supported on a short arm 147. This arm swings in an anti-clockwise direction so as to withdraw the finger bars 146 by a substantially longitudinal movement. Toward the forward end of each guide 145, it is supported on a link 148 which constitutes independent means for supporting the guide. This link is pivotally supported at 149 on a shackle 150 carried on a cross bar 151. With this combination of parts, it will be evident that when the cam roller 152 is on the normal face of the cam 143, the finger bars 146 will lie in a forwardly thrusted position so that their forward ends project into the grooves or slots 153 of the drum 8*b* (see Figure 25).

A coil spring 154 is connected with the cam lever 155 so as to hold the finger bars normally in their forwardly disposed position as indicated in Figure 25.

While a stripper plate such as the stripper plate 57 of Figure 19 will operate satisfactorily if kept clear of the waste material, there is a tendency for the snips or pieces of them to become caught between the points of the teeth 58 in such a way as to interfere with the effective functioning of the stripper teeth. In order to overcome this, we prefer to construct the stripper plate so that it can at times be displaced from the face of the drum at which time it is wiped by an automatic wiper. This construction is illustrated in Figure 28 in which 57*a* indicates the stripper plate and 58*a* indicates the teeth of the stripper plate. This stripper plate normally lies with the points of the teeth 58*a* substantially tangent to the face of the picker drum 8*b* of Figure 28. At the proper time, the shaft 60*a* that carries the stripper plates 57*a* is rocked in a clockwise direction so as to swing the stripper plate away from the drum. As this movement occurs, the teeth 58*a* of the stripper are automatically wiped by a wiper 155, which is attached on a rock shaft 156 parallel with the rock shaft 60*a* (Figure 28). In the operating position, the upper edge of this wiper plate 155 is held against the outer face of the stripper plate through the agency of a coil spring 157 that is attached to an arm 158 rigidly carried on the rock shaft 156. This wiper plate has wipers such as small blocks 159 which lie in the spaces between the teeth 58*a* (see Figure 25). When the picker plate is swung out toward the right as indicated in full lines in Figure 28, the upper edge of the wiper plate 155 will move outwardly along the outer face of the stripper plate and cause the blocks 159 to wipe out the spaces be-

tween the teeth 58a. When the stripper plate moves back to its normal position then spring 157 returns the wiper plate 155 to its normal position. The rocking movement of the wiper shaft 60a is obtained through the medium of an arm 160 rigidly attached to it, and which extends downwardly so as to connect to a link 161, which link is operated by a rock shaft 162 (see Figure 1), which rock shaft constitutes the axis for the lever 101 already described. This rock shaft 162 has a short arm 163 with a roller on its end received in a long slot 164 formed at one end of the link 161. This slot is used in order to provide for lost motion at this point. When the arm 163 travels toward the left as viewed in Figure 28, it will swing the wiper 57a away from the drum. When the arm 163 rocks in the other direction, it permits the coil spring 165 attached to the arm 160 to swing the stripper plate 57a back to its normal position. The slot 164 is sufficiently long to accommodate the full swing of the arm 163 toward the right without enabling the roller on the arm 163 to positively pull the link 161 any further than it should be moved to seat the finger bars 58a against the side of the drum. In other words, this seating of the finger bars is accomplished by spring 165 and not by the movement positively received by the arm 163. The movement of the arm 163 towards the right merely permits the spring 165 to reseat the stripper 57a.

It is desirable to provide means for keeping the slots 14a of the upper drums 14 clear of any waste material that might lodge in them. In order to accomplish this, we prefer to provide each drum with a comb 166 (see Figures 28 and 30). This comb is formed with a hub 167 enabling it to be attached to a cross bar 168 disposed over the upper drum, and the comb is provided with downwardly projecting fingers 169 that project into the slot. A set screw 170 may be employed for securing the combs in place and enabling them to be adjusted to insure that the tips of the fingers 169 will ride properly in the grooves 14a.

In Figure 27, we illustrate the preferred embodiment of the pickers. In this embodiment of the pickers, they are not formed integrally on a picker bar such as the bar 18, but are constructed so that they can be readily placed in the picker channels or slots and secured at any point desired without the use of special tools. For this purpose, each of these pickers 170 has an elongated body of substantially rectangular form to fit the cross-section of a picker slot and this body is provided near its rear end (with respect to the direction of rotation) with an integral spur or hook 171. The body of the picker is provided with a reduced tapered portion 172 enabling it to cooperate with a key or wedge 173 which tapers in an opposite direction. A picker having these characteristics can readily be placed at any point in the picker slot and the wedge 173 dropped into the slot and then wedged up by a sharp blow delivered on the butt end 174 of the wedge. The pickers can be loosened up and removed by applying a sharp blow or pull on the hook or spur 171.

While the picker bars 18 may be employed in a large order where a very great number of similar sheets are to be run through the machine, on small jobs or in cases where adjustability of the pickers on the drums is especially desirable, the form of pickers shown in Figure 27 is to be preferred. The manner in which this picker may be wedged up in the channel is illustrated in Figure 26.

The general mode of the operation of the machine will now be briefly described.

As each cut sheet 5 passes from the die cylinder 4, it passes through the guiding mechanism 6 and thence (see Figure 2), between the drums or rolls 8 and 14. As this takes place, the drum 8 is driven so that its upper face moves in the same direction as the advancing sheet and in a timed relation with respect to the sheet so that the spurs 15 located on the face of the drum engage the snips 16 and withdraw them from the sheet. These snips are later removed from the spurs as indicated in Figure 19.

The sheet with the snips or waste material removed, but with the blanks still connected together by the small tongues or bridges 30 (see Figure 3), then proceeds through the machine and between the runs 61 and 62 of the belts 63 and 64. These belts guide the sheet between the rollers 65 and 66, and 67 and 68, the latter pair of the rollers being driven at a somewhat higher peripheral speed than the former rollers. The result of this is that the rollers 65 and 66 exert a dragging, or retarding, action on the sheet and in this way the blank between the rollers 67 and 68 will be broken away from the next following blank. The blanks broken away from each other in this transverse manner then proceed between the breaker rolls 82 and 83, which break the blanks apart on lines extending longitudinally of the feeding direction.

After this the blanks, still maintaining their relation to each other with respect to the feeding line, move down in inclined direction between the runs 97 and 98 of the belts (see Figure 9), and pass between the shafts 95 and 96, at which point the blanks are laid in order on the carriage belts 108 as the carriage makes its out-stroke (see Figure 9). While the out-stroke of the carriage is taking place, the pressure belts 109 are rotated in the direction of the arrow so that their lower runs move along at the same speed as the carriage and hold the blanks on the supporting belts 108. When the return movement of the carriage begins, these belts 109 remain stationary through the agency of the one-way drive connection to their driving shaft 95, and on this return stroke the supporting belts 108 of the carriage are driven in an outward direction on their upper runs, as indicated by the arrow in Figure 11, thereby counteracting the returning movement of the carriage so that the upper runs of these belts virtually stand still while the carriage is returning. In this way as the carriage advances, the blanks are dropped off the ends of the carriage belts in order as indicated in Figure 11 so as to form a separate pile corresponding to each blank. By reason of this operation of the carriage it will be evident that all the blanks that are cut with a certain die will be laid in the same pile.

This is most desirable because it insures that all the edges of the blanks in a certain pile will match up accurately with each other, giving the piles a neat appearance, and enabling them to be handled with greater reliability by machines that form the boxes from the blanks.

In the operation of the movable guides illustrated in Figure 23, it should be understood that these guides are rocked with their rock shaft 132 at the instant the strip 128 at the last edge of the sheet passes them. This prevents any pos-

sibility of this strip becoming entangled in the finger bars 134. In the construction shown in Figures 24 and 25, these guides do not rock on an axis, but swing on two axes, namely, on the rock shaft 142 and pivot pins 149 so that the finger bars 146 withdraw from the face of the drum by a substantially longitudinal movement.

The rock shaft 162 (see Figure 1 and Figure 28) operates to swing the stripper plate 57*a* periodically away from the drum 8*a* and at this time the upper edge of the wiper plate 155 travels along the teeth 58*a* of the stripper plate and clears them of any adhering waste pieces or particles of waste material.

In mounting the pickers of the type shown in Figure 27 on the drum, this is accomplished by setting the picker in the slot at the point desired and then wedging it in place by means of its wedge 173.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and we do not wish to be limited in the practice of our invention, nor in our claims, to the particular embodiment set forth.

What we claim is:

1. In a mechanism for forming box blanks in sheets with snips of waste material between the blanks, the combination of means for receiving and advancing each sheet of blanks, picker means including a plurality of picker spurs aligned with the snips, having points projecting in the direction in which the sheets advance, and operating to penetrate the snips and withdraw them from between the blanks.

2. In mechanism for forming box blanks in sheets with snips of waste material between the blanks, the combination of a drum, means for rotating the drum, a plurality of spurs carried on the drum, having points projecting in the direction of rotation of the drum, and located in positions to engage the snips, and means for feeding the sheets past the face of the drum, said spurs operating to engage the snips and remove the same from the blanks.

3. In mechanism for forming box blanks in sheets with snips of waste material between the blanks, the combination of a drum, means for rotating the drum, a plurality of spurs carried on the drum, having points projecting in the direction of rotation of the drum, and located in positions to engage the snips, means for feeding the sheets past the face of the drum, said spurs operating to engage the snips and remove the same from the blanks, and means cooperating with the drum to strip the snips from the spurs.

4. In mechanism for forming box blanks in sheets with snips of waste material between the blanks, the combination of means for feeding forward each sheet carrying the blanks, a drum mounted for rotation with its face adjacent the path of the sheets, a plurality of pickers extending circumferentially around the drum, and means for mounting the pickers in different positions on the face of the drum longitudinally of the drum to align with the snips.

5. In mechanism for forming box blanks in sheets with snips of waste material between the blanks, the combination of means for feeding forward each sheet carrying the blanks, a drum mounted for rotation with its face adjacent the path of the sheets, a plurality of pickers extending circumferentially around the drum, and means for mounting the pickers in different positions on the face of the drum to align with the snips, each of said pickers being in the form of a bar having hooked spurs with their points projecting in the direction in which the sheets advance.

6. In mechanism of the kind described, the combination of a drum, a plurality of pickers in the form of circumferentially disposed bars on the drum and carrying spurs, means on the drum for engaging the ends of said bars, and means carried by the drum for tightening the pickers on the drum.

7. In mechanism of the kind described, the combination of a picker drum having a plurality of pickers mounted thereon, said pickers comprising circumferentially disposed bars carrying picker spurs, means for anchoring said pickers at one end on the drum, a tension bar engaging the other ends of the pickers, and means for supporting the tension bar on the drum.

8. In mechanism of the kind described, the combination of a drum having a plurality of grooves on the face thereof, means for mounting a plurality of picker spurs in said grooves, said picker spurs having pointed hooks projecting in the same direction.

9. In mechanism of the kind described, a picker consisting of a circumferentially disposed bar having integral spurs formed thereon.

10. In a machine for forming box blanks cut from the same sheet, the combination of a pair of opposed rollers, means for feeding the sheet carrying the box blanks between the said rollers, one of said rollers having pickers to align with the waste material between the blanks for removing the same, and a guide for receiving the sheet from the rollers having a plurality of guide bars projecting forward into the space between the rollers and cooperating with the pickers to support and guide the sheet as the pickers remove the waste material.

11. In a machine for forming box blanks in a sheet with snips of waste material between the blanks in the sheet, the combination of means for feeding each sheet carrying blanks forwardly, a pair of opposed rollers including a picker roller with means for engaging the snips to pull the same from the sheet, and a guide located on the same side of the sheet as the pickers, for receiving the sheet from the rollers and cooperating with the pickers to guide and support the sheet as the pickers remove the snips.

12. In a machine for forming box blanks in a sheet with snips of waste material between the blanks in the sheet, the combination of means for feeding each sheet carrying blanks forwardly, a pair of opposed rollers including a picker roller with means for engaging the snips to pull the same from the sheet, and a guide for receiving the sheet from the rollers and cooperating with the pickers to guide and support the sheet as the pickers remove the snips, and feeding means located over the guide for engaging the upper face of the sheet to advance the same across the guide.

13. In a machine for forming box blanks in a sheet with snips of waste material between the blanks in the sheet, the combination of means for feeding each sheet carrying blanks forwardly, a pair of opposed substantially tangent rollers including a picker roller with means for engaging the snips to pull the same from the sheet, a guide for receiving the sheet from the rollers mounted with its forward end located adjacent the point of tangency of said rollers and cooperating with the pickers to guide and support the sheet as the pickers remove the snips, and feeding means in-

cluding a roller associated with the guide and cooperating with the guide to receive each sheet from the pair of rollers, to feed each sheet forwardly in the feeding direction.

14. In a machine for forming box blanks in a sheet with snips of waste material between the blanks in the sheet, the combination of means for feeding each sheet carrying blanks forwardly, a pair of opposed rollers including a picker roller with means for engaging the snips to pull the same from the sheet, a guide for receiving the sheet from the rollers and cooperating with the pickers to guide and support the sheet as the pickers remove the snips, and feeding means associated with the guide having means for engaging the upper and lower faces of the sheet to feed the same forward in the feeding direction across the guide.

15. In picker mechanism of the kind described, a guide for taking a sheet from between a pair of rollers comprising in combination a body and a plurality of finger bars mounted on the body with means for securing certain of said bars at will in an advanced position and projecting up into the space between the rollers.

16. In picker mechanism of the kind described, a guide for taking a sheet from between a pair of rollers comprising in combination, a body and a plurality of finger bars mounted on the body with means for securing certain of said bars at will in an advanced position and projecting up into the space between the rollers, and means for mounting the body for adjustment on an axis substantially parallel with the axes of the rollers.

17. In a machine for forming box blanks cut in the same sheet, the combination of means for feeding forward the sheets carrying the blanks, and means in the path of the sheets for breaking the blanks apart on lines substantially parallel to the feeding direction.

18. In a machine for forming box blanks cut in the same sheet, the combination of means for feeding forward the sheets carrying the blanks, means in the path of the sheets for subjecting the sheets to a light tension exerted in the feeding direction to separate the blanks from each other on lines transverse to the feeding direction, and means in the path of the sheets for breaking the blanks apart on lines substantially parallel to the feeding direction.

19. In a machine for forming box blanks cut in the same sheet, the combination of means for feeding forward the sheets carrying the blanks, means for breaking the blanks apart on lines transverse to the feeding direction, means for breaking the blanks apart on lines substantially parallel to the feeding direction, and means for laying the blanks in piles corresponding to the number of blanks cut from each sheet.

20. In a machine for forming box blanks cut in the same sheet, the combination of means for feeding forward the sheets carrying the blanks, means for breaking the blanks apart on lines transverse to the feeding direction, means for breaking the blanks apart on lines substantially parallel to the feeding direction, a reciprocating carriage for carrying the blanks forward after being broken apart, and means cooperating with the carriage to lay the blanks in piles corresponding to the different blanks.

21. In a machine for forming box blanks cut in the same sheet, the combination of means for feeding forward the sheets carrying the blanks, means for breaking the blanks apart on lines transverse to the feeding direction, means for breaking the blanks apart on lines substantially parallel to the feeding direction, a reciprocating carriage for receiving the blanks, a plurality of supporting belts mounted on the carriage and extending longitudinally with the direction of reciprocation of the carriage, a plurality of presser belts extending longitudinally over the carriage belts and cooperating with the same to hold the separated blanks in position during the forward stroke of the carriage, means for driving the belts, and alternately holding them fixed during the carriage movements, enabling the belts to cooperate with the carriage to lay the blanks in piles corresponding to the blanks.

22. In a machine for forming box blanks cut in the same sheet, the combination of means for feeding forward the sheets carrying the blanks, means for breaking the blanks apart on lines transverse to the feeding direction, means for breaking the blanks apart on lines substantially parallel to the feeding direction, a receiving table for the blanks, and means for laying the blanks in piles on the table corresponding to the number of blanks cut from each sheet.

23. In a machine for forming a plurality of box blanks in a sheet, the combination of a frame, a picker drum and a presser drum mounted in the frame with their faces adjacent, means for driving the picker drum, means for feeding the sheet carrying the blanks between the drums, means on the picker drum for removing the snips of waste material between the blanks in the sheet, means for feeding each sheet forward from the drums, means for breaking the blanks of each sheet apart on lines transverse to the feeding direction, and means for breaking the blanks apart on lines substantially parallel to the feeding direction.

24. In a machine for forming a plurality of box blanks in a sheet, the combination of a frame, a picker drum and a presser drum mounted in the frame with their faces adjacent, means for driving the picker drum, means for feeding the sheet carrying the blanks between the drums, means on the picker drum for removing the snips of waste material between the blanks in the sheet, means for feeding each sheet forward from the drums, means for breaking the blanks of each sheet apart on lines transverse to the feeding direction, means for breaking the blanks apart on lines substantially parallel to the feeding direction, and means for receiving the separated blanks and for laying the same in piles.

25. In a machine for forming a plurality of box blanks in a sheet, means for guiding and feeding forward each sheet of blanks, means for detaching the blanks from each other on lines extending transversely to the feeding direction, and means for separating the blanks from each other along lines substantially parallel with the feeding direction.

26. In a machine for handling sheets of box blanks having a waste strip extending across the sheet, the combination of a picker drum, means for feeding a box blank over the face of the picker drum, guiding means for guiding the blank away from the drum, and means for actuating the guiding means when the waste strip arrives at the same, to detach the waste strip from the remainder of the sheet.

27. In a machine for handling sheets of box blanks having a waste strip extending across the sheet, the combination of a rotary picker drum

having means for engaging the waste strip, means for feeding the sheets over the face of the drum, guiding means for guiding the blank away from the drum having finger bars normally lying adjacent to the face of the drum to guide the sheet off of the same, and means for shifting the finger bars away from the face of the drum when the waste strip passes the same.

28. In a machine for handling sheets of box blanks having a waste strip extending across the sheet, the combination of a rotary picker drum having means for engaging the waste strip, means for feeding the sheets over the face of the drum, guiding means for guiding the blank away from the drum having finger bars normally lying adjacent to the face of the drum to guide the sheet off of the same, and means for rocking the finger bars on an axis to move them away from the face of the drum when the waste strip passes the same.

29. In a machine for handling sheets of box blanks having a waste strip extending across the sheet, the combination of a rotary picker drum having pickers carried thereby for engaging the waste strip, means for feeding the sheets over the face of the drum, a rock-shaft mounted near the drum, a plurality of finger bars supported on the rock-shaft with their ends normally lying adjacent to the face of the picker drum to guide the sheet off the same, and means for rocking the rock-shaft in timed relation to the rotation of the drum to shift the finger bars away from the face of the drum when the waste strip passes the same.

30. In a machine for handling sheets of box blanks having a waste strip extending across the sheet, the combination of a rotary picker drum having pickers carried thereby for engaging the waste strip, means for feeding the sheets over the face of the drum, a rock-shaft mounted near the drum, a plurality of finger bars, means for supporting the same on the rock-shaft, means for supporting the finger bars independently of the rock-shaft, and means for rocking the rock-shaft in timed relation to the rotation of the drum to shift the finger bars away from the face of the drum when the waste strip passes the same.

31. In a machine of the kind described for handling sheets of box-blanks with waste pieces between the blanks, a rotary picker member having pickers for engaging the waste pieces to remove the same from the sheet, a stripper plate cooperating with the rotary picker member to strip the waste pieces from the same, and means for wiping the stripper plate to clear the same of adhering waste.

32. In a machine for handling sheets of box-blanks with waste pieces between the blanks, the combination of a rotary picker drum having pickers for engaging the waste pieces to withdraw the same from the sheets, a stripper plate adjacent the drum for stripping the waste pieces from the pickers, means for supporting the stripper plate and for moving the same to displace it from the drum, and automatic means for wiping the stripper plate when displaced from the drum.

33. In a machine for handling sheets of box-blanks with waste pieces between the blanks, the combination of a rotary picker-drum having pickers for engaging the waste pieces, a stripper plate having a plurality of teeth with their ends adjacent the face of the drum for stripping the waste pieces from the pickers, means for supporting the stripper plate to rock on an axis to enable the ends of the teeth to swing away from the drum, and automatic means for wiping the teeth of the stripper plate.

34. In a machine for handling sheets of box-blanks with waste pieces between the blanks, the combination of a rotary picker-drum having pickers for engaging the waste pieces, a stripper plate having a plurality of teeth with their ends adjacent the face of the drum for stripping the waste pieces from the pickers, means for supporting the stripper plate to rock on an axis to enable the ends of the teeth to swing away from the drum, a wiper mounted to rotate on an axis adjacent the stripper plate and having means lying between the teeth of the stripper plate to cooperate with the stripper plate when the same is rocked on its axis, for wiping the waste pieces from the said teeth.

35. In a machine of the kind described, the combination of a picker member having a slot, a picker having a body received in the said slot and having a spur projecting outwardly from the face of the picker member, and means cooperating with the picker body for securing the same in the slot.

36. In a machine of the kind described, the combination of a rotary picker member having a slot in the face thereof, a picker having a body with a tapered portion received in the said slot and having a spur projecting from the face of the drum, and a wedge cooperating with the tapered portion of the picker body for securing the same at any point in the slot.

37. In a machine of the kind described, a picker having a body with a tapered portion with a spur projecting from the body, and a wedge cooperating with the tapered portion of the picker body for securing the same.

38. In a machine for forming box blanks cut from the same sheet, the combination of a pair of opposed rollers, including an upper roller and a lower roller, means for feeding the sheet carrying the box blanks between the said rollers, said lower roller having pickers to align with the waste material between the blanks for removing the same, and a guide for receiving the sheet from the rollers having a plurality of guide bars projecting forward into the space between the rollers and adjacent to the paths of the pickers, and cooperating with the pickers to support and guide the sheet as the pickers remove the waste material.

39. In a machine for producing carton blanks or the like, the combination of a die plate support and a cooperating impression member, mechanism for automatically separating and removing waste portions from blanks, said mechanism including complementary rotary members to which blanks are conveyed from said impression member, one of said rotary members being provided with a plurality of guide means for picker elements, picker elements arranged for adjustment circumferentially of the guide means for alignment with any part of a waste portion in order to penetrate and remove it from a blank.

40. In a machine for producing carton blanks or the like a reciprocating die plate support and a cooperating impression cylinder, mechanism for automatically separating and removing waste portions from blanks, said mechanism including complementary rotary members to which blanks are conveyed from said impression cylinder, one of said rotary members being provided with picker elements having points projecting in the direction of rotation of said member to penetrate and remove waste portions from a blank.

41. In a machine for producing carton blanks or the like a die plate support and a cooperating impression member, mechanism for automatically separating and removing waste portions from blanks, said mechanism including complementary rotary members to which blanks are conveyed from said impression member, one of said rotary members being provided with picker elements having points projecting in the direction of rotation of said member and arranged for adjustment both longitudinally and circumferentially of the latter for alignment with any part of a waste portion in order to penetrate and remove it from a blank.

42. In mechanism for forming box blanks in sheets with snips of waste material between the blanks, the combination of means for feeding forward each sheet carrying the blanks, a drum mounted for rotation with its face adjacent the path of the sheets, a plurality of pickers, a plurality of guide means for the same extending circumferentially around the drum at different locations on the drum, and means for mounting the pickers in different circumferential positions on said guide means on the face of the drum to align with the snips.

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