

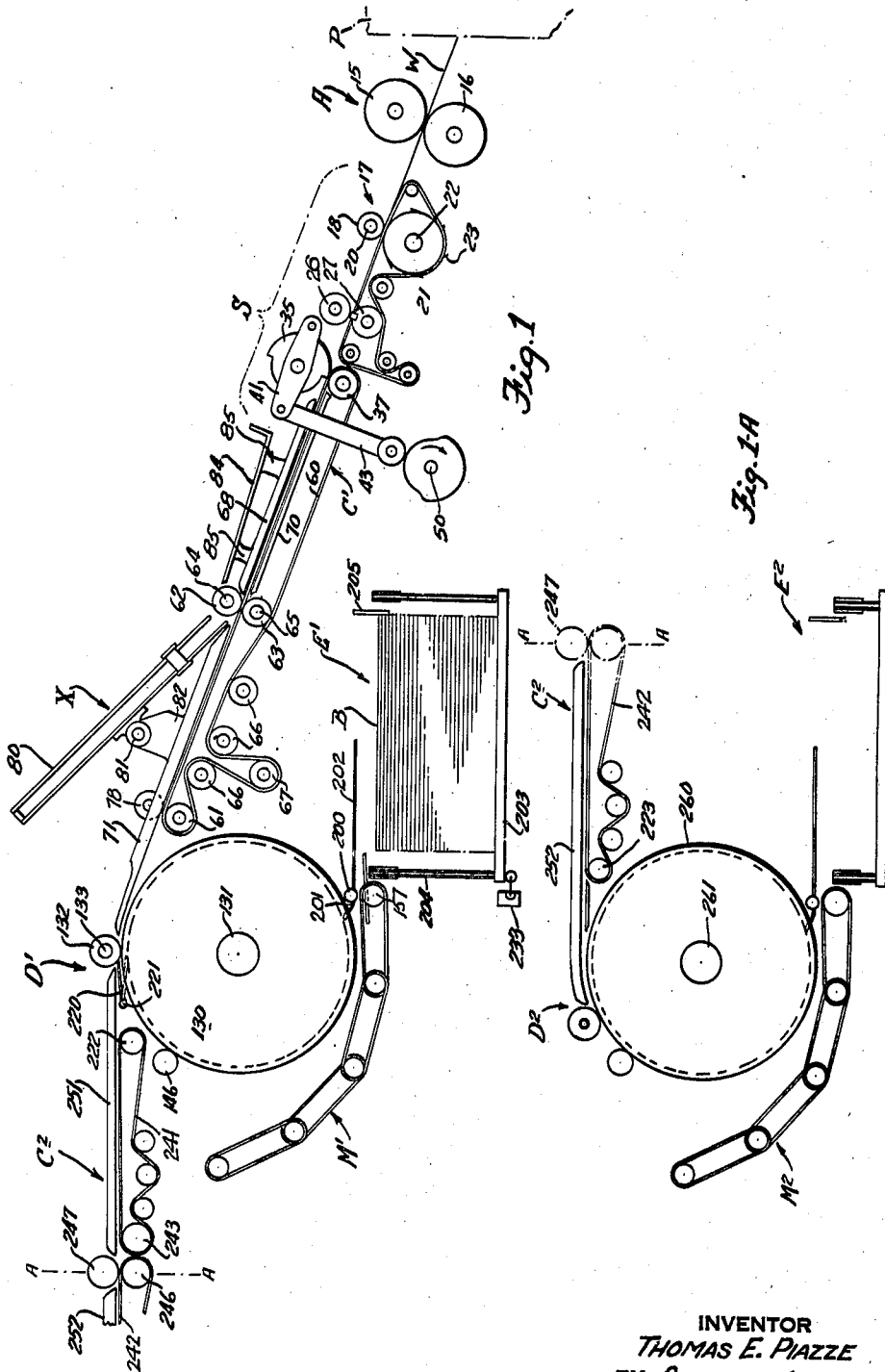
Aug. 4, 1942.

T. E. PIAZZE
DELIVERY APPARATUS

2,291,754

Filed May 5, 1941

5 Sheets-Sheet 1



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Aug. 4, 1942.

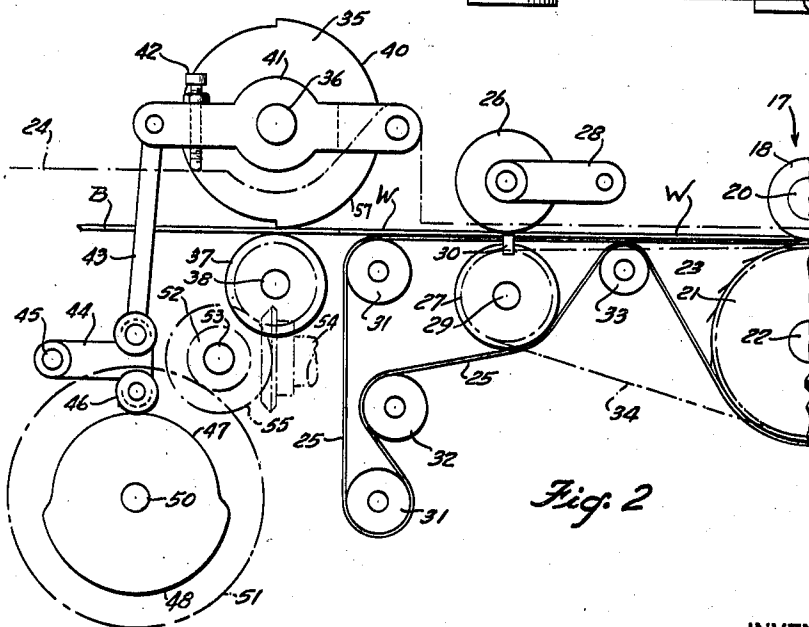
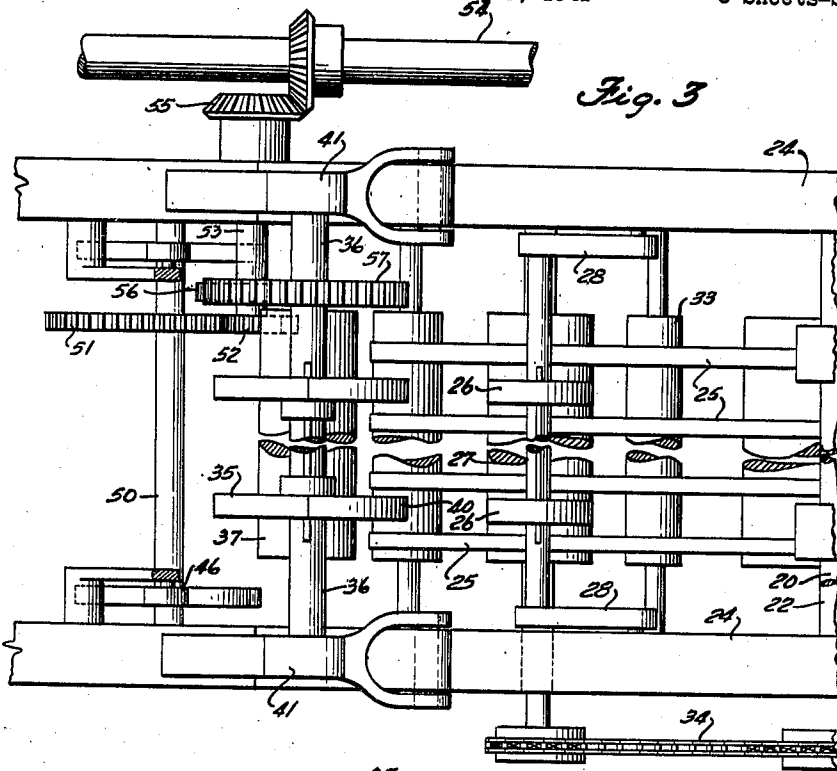
T. E. PIAZZE

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DELIVERY APPARATUS

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5 Sheets-Sheet 2



Aug. 4, 1942.

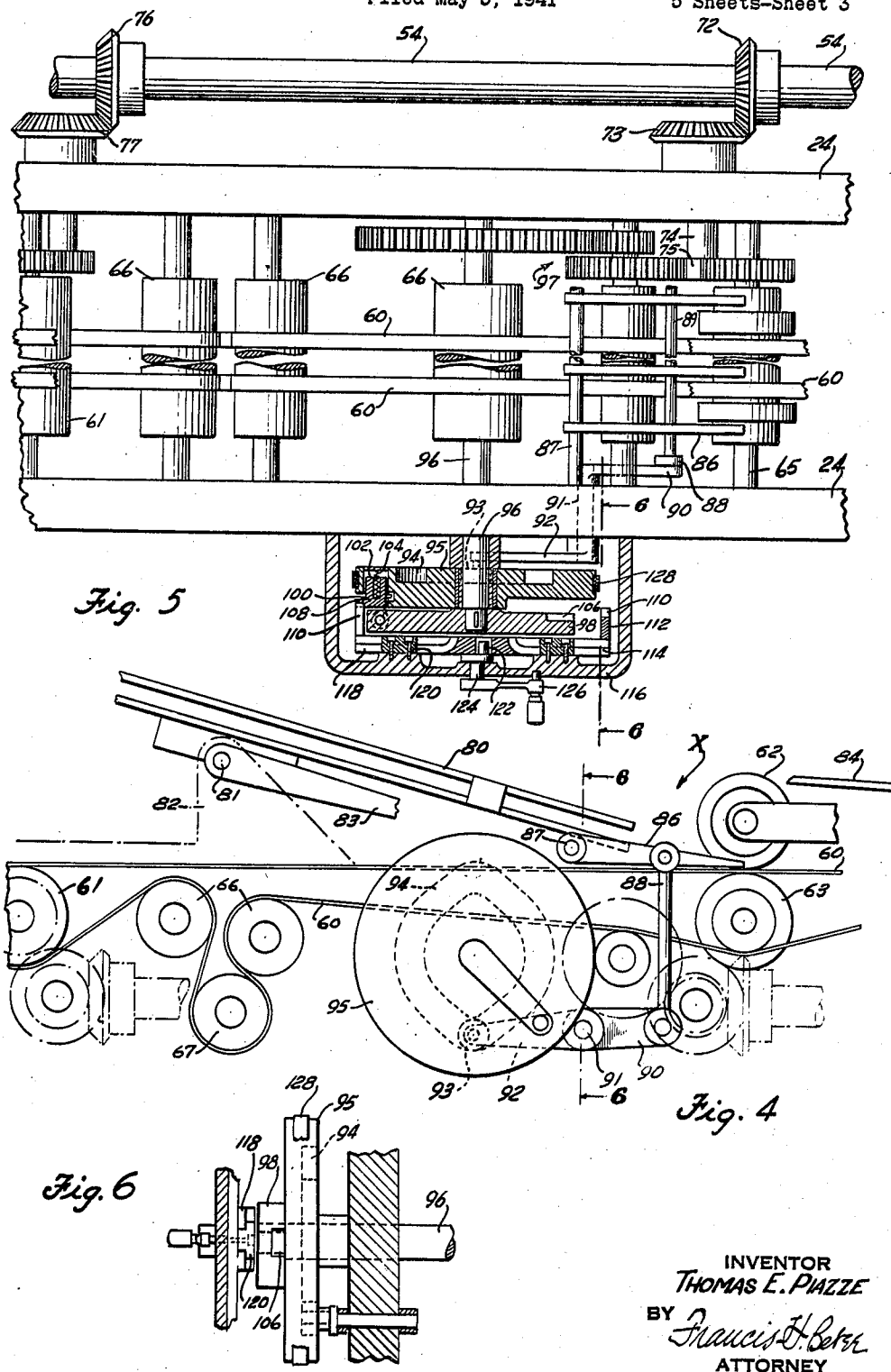
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DELIVERY APPARATUS

Filed May 5, 1941

5 Sheets-Sheet 3



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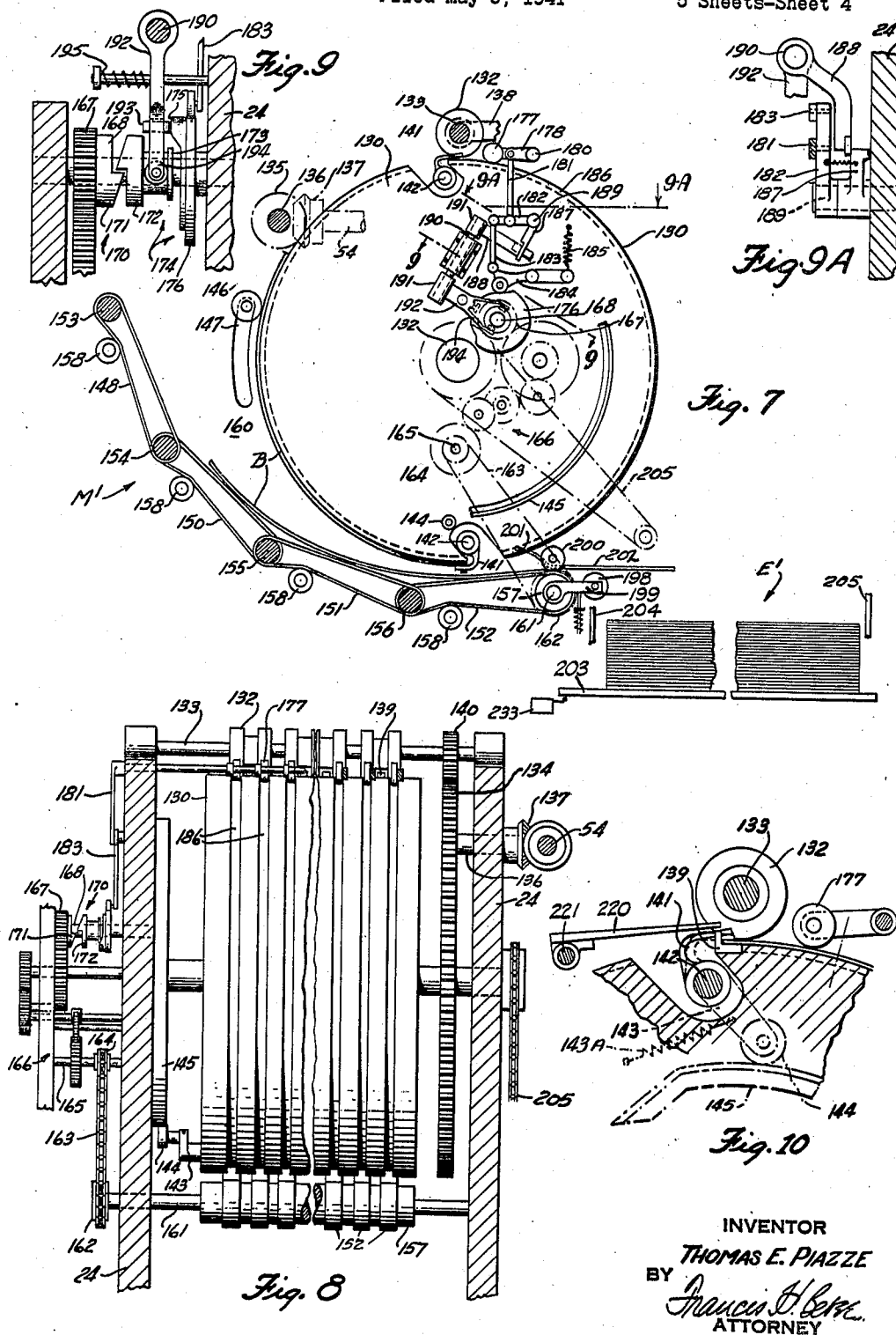
Aug. 4, 1942.

T. E. PIAZZE
DELIVERY APPARATUS

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5 Sheets-Sheet 4



Aug. 4, 1942.

T. E. PIAZZE

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DELIVERY APPARATUS

Filed May 5, 1941

5 Sheets-Sheet 5

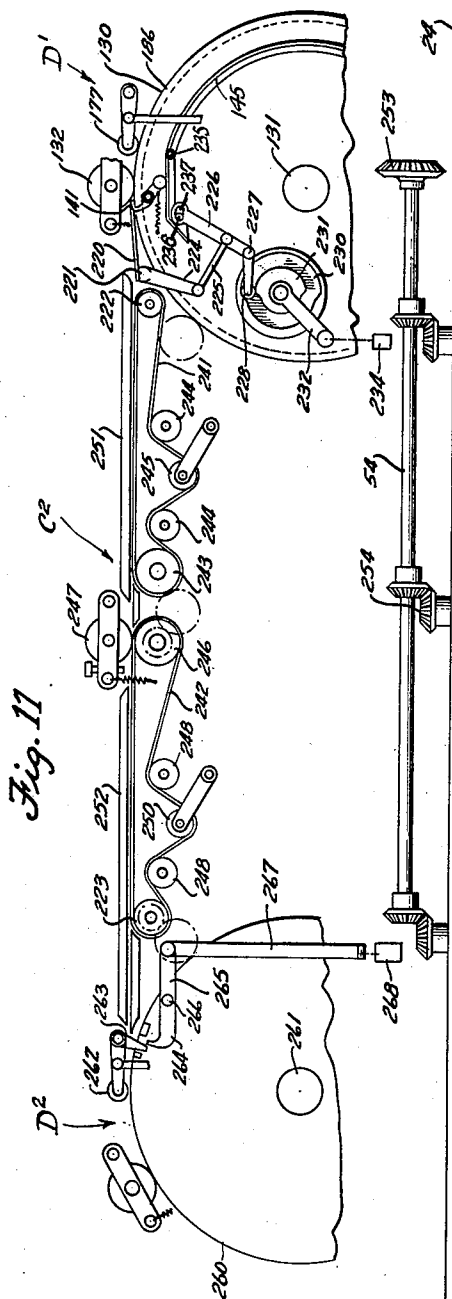


Fig. 11

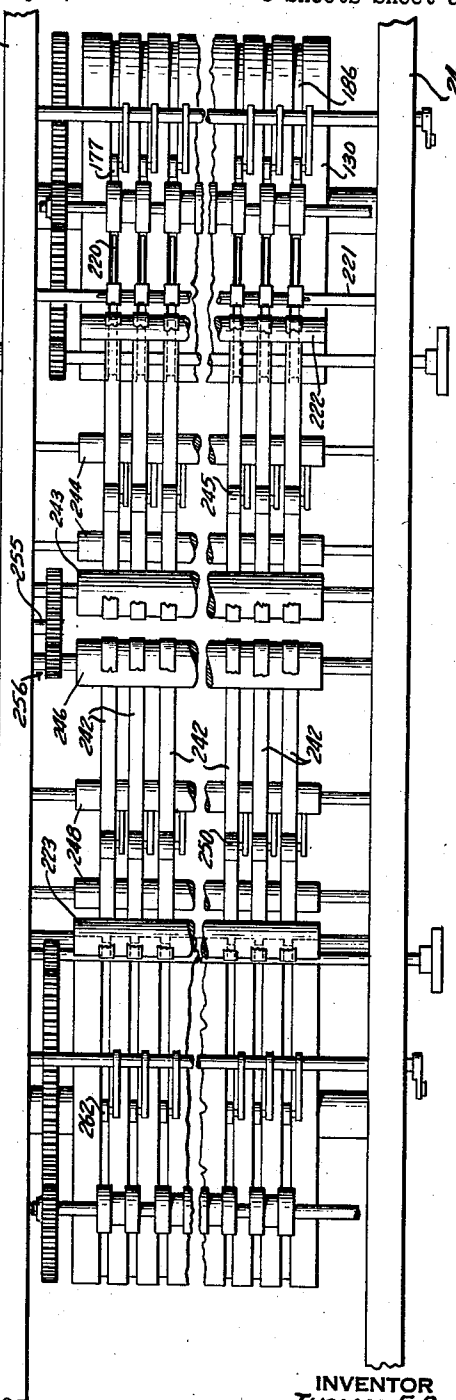


Fig. 12

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UNITED STATES PATENT OFFICE

2,291,754

DELIVERY APPARATUS

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mesne assignments, to Interchemical Corpora-
tion, New York, N. Y., a corporation of Ohio

Application May 5, 1941, Serial No. 391,852

32 Claims. (Cl. 164—61)

This invention relates to delivery apparatus and aims to provide an improved apparatus for continuously separating sheets or blanks from a traveling web and delivering them in vertically arranged piles. More particularly, the invention contemplates the provision of such an apparatus which is adapted to handle multiple blanks consisting of two or more blanks weakly held together along their adjoining side edges by means of tabs but separated along a line extending transversely across the web.

Recently apparatus has been developed for continuously producing carton blanks, at speeds heretofore unattainable, from a traveling web of paper board which is wide enough (about 36 inches) for the side-by-side production of more than one blank. This apparatus includes elements for printing any desired design in a plurality of colors upon the moving web, cutting and scoring the printed web into blanks of the desired configuration and removing waste material. In order that a web which has been cut and scored in this manner may be properly handled, it is the usual practice to provide small tabs between the blanks so that the cut and scored material remains in web form until separated, the separation taking place along lines extending transversely across the web so as to form multiple blanks in which two or more individual blanks are still held together along their adjoining side edges by the tabs. It will be apparent that with the web cut and scored and the individual blanks held together merely by small tabs which are purposely very weak, it is somewhat difficult to handle. In fact, the difficulties are so great that there has been no separating and delivering apparatus available which could handle such blanks at their speed of production which, in the apparatus referred to, is approximately six hundred per minute. In terms of carton blanks of about 12 to 16 inches in length, this web speed would produce about six hundred multiple blanks per minute, whereas the available delivery apparatus for material of this character could only handle from thirty to sixty multiple blanks per minute.

The apparatus which I have invented operates in timed relation with the cutting and scoring mechanism and comprises a stripper for removing waste material, an element rotating at greater speed than the cutting mechanism for separating the cut and scored blanks only along lines extending transversely across the web, a conveyor associated with the rotating element for receiving the separated multiple blanks and feeding

them at spaced intervals, a pair of alternately operating rotating gripper drums for properly aligning the separated multiple blanks and depositing them in uniform overlapping relation on an accumulator conveyor and an elevator delivery pile for continuously receiving the accumulated blanks. The whole operation of the gripper drums and their associated accumulator conveyors is such that a vertically arranged pile may be formed adjacent one drum, and when completed the operation of this drum stopped and delivery in a vertical pile adjacent the second drum started.

A particularly important feature of this two-drum arrangement is that when collection and delivery at the second drum is started, the operation of the first will be continued until all of the blanks arranged in uniform overlapping relation on the accumulator conveyor are finally delivered in the desired vertical pile. My improved apparatus also includes a sheet interceptor so that the attendant can remove a multiple blank from the conveyor, for purposes of inspection, before it reaches the first gripper drum. Means are also provided for automatically stopping the accumulator conveyor at any time that a blank fails to be delivered thereto at its proper spaced and timed interval so as to maintain the uniform overlapping relation of the blanks on said accumulator conveyor.

The above and other features and objects of my invention will be apparent upon consideration of the following detailed description and the accompanying drawings, in which

Fig. 1 is a diagrammatic side elevational view of a part of an apparatus in which my invention has been embodied showing its association with a rotary cutting apparatus and extending from said cutter to the line A—A;

Fig. 1A is a continuation of the apparatus shown in Fig. 1 from the line A—A to the end of the apparatus;

Fig. 2 is a somewhat schematic and enlarged side elevational view of a portion of the apparatus shown in Fig. 1 illustrating the sheet separating means and the various drives associated therewith;

Fig. 3 is a plan view of the apparatus shown in Fig. 2;

Fig. 4 is an enlarged side elevational view of the sheet interceptor shown in Fig. 1;

Fig. 5 is a plan view, partly in section, of the apparatus shown in Fig. 4;

Fig. 6 is a transverse vertical sectional view taken along the line 6—6 of Fig. 4;

Fig. 7 is a diagrammatic side elevational view, on a somewhat enlarged scale, of the first gripper drum and its associated apparatus including the accumulator conveyor;

Fig. 8 is a fragmentary front elevational view of the apparatus shown in Fig. 7.

Figs. 9 and 9A are transverse vertical sectional views, largely diagrammatic and taken substantially along the lines 9—9 and 9A—9A, respectively, of Fig. 7, showing the controlling mechanism for interrupting the operation of the accumulator conveyor;

Fig. 10 is an enlarged fragmentary detail view, mainly in vertical section, showing the action of the aligning pins and gripper mechanism for picking up a blank;

Fig. 11 is a side elevational view on a somewhat enlarged scale of a portion of the apparatus shown in Fig. 1, illustrating particularly the conveyor means provided between the two gripper drums; and

Fig. 12 is a plan view of the portion of the apparatus shown in Fig. 11.

Referring now to the drawings, and particularly to Figs. 1 and 1A, it will be observed that a web W of paper board which has been printed in one or more colors in a printing unit P is fed to a rotary cutting apparatus A which includes an upper impression cylinder 15 and a lower cooperating cutting cylinder 16 and may be of the general construction disclosed in the copending application of Joseph A. Parks, Jr., and James W. Batchelder, Serial No. 331,109, filed April 23, 1940. This cutting apparatus is adapted to cut the web W into blanks of any desired configuration; and the blades in the cutting cylinder are so arranged that small uncut portions or tabs hold the cartons in web form for stripping, separating and final delivery as multiple blanks consisting of at least two blanks held together at their adjoining side edges by the tabs. Thus, the web W is fed from the cutter to a separating mechanism S which includes a stripper 17, for removal of waste material which does not form part of the finished blank, a pair of web feeding and holding rollers and the actual separating rollers, all of which will be described more fully hereinafter. The feeding and holding rollers are constructed to move the web forward at the same speed at which it passes through the printing units and the cutting apparatus and periodically to exert a holding or gripping action on the web. However, the separating rollers operate at a surface speed greater than that of the feeding and holding rollers and are constructed and mounted so that one of said separating rollers will contact the web at predetermined intervals (corresponding to the periodic holding or gripping of the web by the feeding and holding rollers) so as to cause the individual blanks to be separated one from another along a line extending transversely across the web. Where the apparatus is of sufficient width to provide for more than one blank, the adjacent blanks continue to be held together by the uncut tab portions. In the present instance where the web W is wide enough for two carton blanks, the multiple blanks B which are separated from the web by the separator S are actually two individual blanks long and two blanks wide and all the blanks secured together at their adjoining side edges by the uncut tab portions.

As these multiple blanks are separated from the web, they are gripped by a conveyor C¹ which operates at an increased speed so that the blanks

may be moved in spaced relation. As indicated in Fig. 1, this conveyor C¹ includes a sheet-intercepting mechanism X which may be actuated whenever desired to remove a blank from the conveyor for purposes of inspection. The blanks carried by the conveyor C¹ are moved to a first delivery apparatus D¹ which is arranged to align and grip the individual sheets or blanks and deposit them in uniform overlapping relation upon an accumulator conveyor M¹. The conveyor M¹ operates at a relatively slow speed so that the blanks deposited thereon are overlapped one upon another for delivery to and deposit upon an elevator E¹ where they are arranged and jogged into a uniform vertical pile.

When the pile of delivered blanks on the elevator E¹ reaches a predetermined height, mechanism associated with the delivery D¹ operates automatically or manually to prevent further sheets from being deposited upon the slowly moving accumulator conveyor M¹, and instead, feeds them to a horizontally disposed conveyor C² which carries the sheets or blanks to the second delivery apparatus D² which is substantially identical with the delivery apparatus D¹ in that it includes a slow moving accumulator conveyor M² for feeding the sheets in overlapped relation to an elevator E² where they are arranged in a suitable vertically disposed pile.

The various parts or elements of the apparatus referred to in the preceding description will now be described in further detail, starting with the separating mechanism S and following the cut and separated blanks through the remainder of the apparatus. For simplicity of terminology, I will refer to rollers and cylinders throughout the description, but it will be apparent from the drawings and to those skilled in the art that these terms are intended to include a plurality of discs fixed upon a shaft in spaced relation.

As mentioned above, it is the function of the entire separating mechanism S to place the blanks in condition so that they may be subsequently delivered at the desired rate of speed. That is, if the configuration of the individual blanks is such that there is waste material in the web, such waste material is preferably removed prior to the separation of the blanks. In the present instance, I have shown in Figs. 1 and 2 the rotary pin-stripper 17 for effecting the removal of waste material. This mechanism comprises an upper rotating impression cylinder 18 having a shaft 20 and adapted to press the web W into operative contact with a stripping cylinder 21 mounted on a shaft 22 and having a plurality of angularly disposed pins 23 suitably arranged on the outside surface thereof for engagement with the waste portions of the web W which it is desired to have removed. Stripping mechanisms are well known in the art and any desired form may be used in the practice of my invention. The shafts 20 and 22 are journaled in suitable bearings provided in spaced side frames 24, 24 which are shown in Fig. 3 and most of the remaining figures of the drawings, and constitute the unitary side frames of the entire apparatus. The waste material removed from the web W by the pins 23 is withdrawn from said pins in any conventional manner and may be disposed of through a suction blower, a conveyor or the like.

Having the waste material removed from the web W, said web is nevertheless in continuous form and should be separated into the individual multiple blanks for their final delivery. This

is accomplished by means of the combined holding and separating apparatus illustrated in Figs. 2 and 3. As shown, the web W is fed from the stripping mechanism 17 on a plurality of feeding tapes 25 to a pair of cooperating holding and feeding rollers 26 and 27, the former of which is rotatably mounted on a pair of arms 28 pivotally attached to the side frames 24, 24 in a position above the web W, and the latter of which is positioned below the web and has its shaft 29 journaled in the side frames. The cooperating rollers 26 and 27 constitute a holding or gripping device for periodically gripping the web W to maintain it in proper position during the separation of the individual blanks therefrom; and for this purpose the lower roller 27 is provided with a raised gripping surface 30 which is adapted to press against the web once during each revolution. The diameter and speed of rotation of the roller 27 are such that the holding of the web effected by contact of the gripping portion 30 therewith and the cooperative pressing of the roller 26 on the upper side of the web will occur at least once during the passage therebetween of a unit length of the web W which is equivalent to the length of each individual (as distinguished from multiple) blank.

As shown in Fig. 2, the feeding tapes 25 which support the web W during its passage from the stripper 17 through the holding mechanism 26, 27 are of the endless type and pass about the stripping cylinder 21, between the rollers 26, 27, around suitable guide rollers 31, a slack take-up roller 32 and an intermediate supporting roller 33. The feeding tapes 25, the stripper 17 and the holding rollers 26, 27 are all driven at a surface speed corresponding to that of the web W. Thus, the stripping cylinder 21 may have its shaft 22 driven directly from the main drive of the entire apparatus and its rotative motion transmitted to the holding roller 27 by means of a chain 34 which passes about suitable sprockets provided on the shafts 22 and 28; and the intermediate supporting roller 33 may be driven by means of suitable cooperating gears (Fig. 3) associated with the shaft 22 and the shaft for the roller 33.

It will be noted that the first guide roller 31 for the tapes 25 is positioned forward of (or to the left in Fig. 2) the holding rollers 26 and 27 so that the web W will be supported while being held by the holding rollers 26 and 27 and is fed between an upper movable separating roller 35 having a shaft 36 and a lower cooperating roller 37 having a shaft 38 which is journaled in the side frames 24, 24. The separating cylinder 35, which is provided with an enlarged web or blank contacting portion 40 extending throughout half of its circumference, is arranged to be moved into and out of operative contact with the web W once during the passage beneath it of a length of web equivalent to the length of one of the multiple blanks. For this purpose, the shaft 36 is rotatably mounted in a pair of supporting arms 41 one or both of which may have one end pivotally connected to the side frames 24, and the other end pivotally connected to the upper end of a link 43 and provided with an adjusting screw 42 which bears against the frame for limiting the downward movement of the arms. The lower end of each of the links 43 is connected to the upper side of the outer end of a lever 44 pivoted at 45 to the side frames and having a cam roller 46 mounted on the lower side of the outer end thereof. Said rollers 46 are arranged to con-

tact suitable cams 47 having high points 48 and mounted on a cam shaft 50 which is journaled in the side frames 24, 24. The cam shaft 50 is rotated at the desired speed by means of a gear 51 mounted thereon and meshing with a gear 52 provided on one end of a stub shaft 53 which is connected for rotation with a drive shaft 54 by means of suitable miter gears 55. This shaft 54 and stub shaft 53 also effect rotation of the cylinder 35 by means of a gear 56 (Fig. 3) mounted on the stub shaft and cooperating with a gear 57 mounted on the cylinder shaft 36.

Due to the shape and surface length of the high point 48, as shown in Fig. 2, it will be apparent that during each revolution of the cam shaft 50, the levers 44, links 43 and supporting arms 41 will cause the separating cylinder 35 to be moved upwardly a distance sufficient to bring it out of contact with the web W. However, during the remaining half of a revolution, said cylinder 35 will be lowered and the arrangement is such that the enlarged contact portion 40 will engage the web W. This engagement occurs simultaneously with the gripping and holding of the web W by the cooperating cylinders 26 and 27 and, due to the fact that the separating cylinder is rotated at a greater surface speed than the cylinders 26 and 27, a multiple blank B will be separated or pulled from the momentarily held web W and fed forward at the increased rate of speed. It will be understood that where the multiple blank B is more than one individual blank in length, the spacing between and the timing of the separating and holding rollers is particularly important because the separating action should take place between two individual blanks so that proper control may be effected. Any intervening blank between the one being acted upon by the separating roller and the one being held by the gripping roller will cause difficulty.

As the multiple blanks B are separated from the web W in the manner described above, they are fed into the conveyor C¹ which is adapted to feed them to the first delivery apparatus D¹. As indicated in Fig. 1, the conveyor C¹ includes a plurality of endless tapes 60 which provide a path for the sheets extending from the lower roller 37 of the separating mechanism to a forward roller 61 positioned adjacent the first delivery apparatus D¹. The tapes pass over the roller 37, between an intermediate pair of feed rollers 62 and 63 having shafts 64 and 65, respectively, over the forward roller 61 and around a plurality of lower guide rollers 66 and a slack take-up roll 67. The conveyor C¹ is completed by an upper guide member 68 and lower guide member 70 positioned between the separating rolls 35 and 37 and the feed rollers 62 and 63, and an upper guide member 71 extending from the feed rollers 62 and 63 to the first delivery apparatus D¹, all of said guide members being attached in any conventional manner to the side frames 24, 24.

Drive shaft 54 is provided with a miter gear 72 (Fig. 5) which cooperates with a miter gear 73 mounted on a transverse shaft 74 and connected through gears 75 with the shaft 65 of the lower feed roller 63. Similarly, a miter gear 76 mounted on the shaft 54 and cooperating with a miter gear 77 mounted on a stub shaft which is geared to the shaft of the forward roller 61 transmits driving power to said forward roller which may be provided with a cooperating propeller roller 78, if desired. Propeller roller 78

and upper feed roller 62, together with additional propeller rollers that may be required depending upon the length of the multiple blanks, provide a positive feed for the blanks and insure their passage to the delivery apparatus D¹. The propeller rollers are preferably adjustable in the direction of travel of the blanks for the accommodation of blanks of different sizes.

All of the shafts for the various driven rollers of the conveyor may be journaled in suitable bearings provided in the spaced side frames 24, 24. It will be apparent that the shaft 54 is the same one which drives the rollers 35 and 37 of the separating mechanism at the increased speed and, therefore, the conveyor tapes 60 may be moved at a corresponding increased speed. Thus, the individual blanks B fed thereto in spaced relation by the separating mechanism will be maintained in their spaced relation for feeding into the first delivery apparatus D¹.

Oftentimes, in the feeding of the separated multiple blanks B to the delivery apparatus D¹, it is desired to inspect one of the finished blanks to determine whether or not the printing and cutting operations are being properly performed. Due to the fact that the blanks are delivered at a rather high rate of speed into the elevator E¹, it is not always convenient or possible to remove a blank for inspection purposes. I have devised the novel sheet intercepting mechanism X for removing single blanks from the conveyor C¹ as they are being fed from the separating mechanism S to the delivery apparatus D¹.

Referring to Figs. 1, 4 and 5, it will be seen that the sheet intercepting mechanism X comprises a sheet or blank receiving box or member 80 which is pivotally mounted at 81 upon an extension 82 of the side frames. This sheet receiving member 80 is provided with an operating handle 83 so that it may be turned about its pivot to an upper position so as to permit any sheet or blank received therein to slide downwardly and be propelled by the roller 62 to a receiving table 84 which is mounted on legs 85 also attached to the side frames 24 or any suitable transverse supporting members, and from which the intercepted blank may be removed by the attendant for inspection.

In order to remove one of the blanks B from the tapes 60 of the conveyor C¹, I have provided the sheet removing mechanism shown in Figs. 4, 5 and 6, which, upon being actuated, is adapted to remove a single sheet and then cease operating until again actuated by the attendant. This mechanism comprises a plurality of intercepting fingers 86 rotatably mounted upon a shaft 87 fixedly mounted in the side frames 24. These fingers extend from a point adjacent the opening which leads to the sheet receiving member 80 to a position between or adjacent the feed rollers 62 and 63 and are normally in the upper inoperative position shown in Fig. 4. A link 88 connected to a shaft or connecting rod 89 passing through the fingers 86 extends downwardly adjacent one of the side frames 24 and is pivotally connected at its lower end to a crank arm 90 keyed on a shaft 91 which extends through the side frame 24 and has a second crank arm 92 mounted thereon outside the frame and provided with a cam roller 93 at the outer end thereof. The cam roller 93 is adapted to ride in a cam groove 94 of an internal cam 95 rotatably mounted on a shaft 96 which supports the lowermost guide roller 66 for the conveyor tapes 60. It will be noted in Fig. 4 that the cam groove 94 is substantially elliptical in

shape so that when the cam 95 is rotated for half a revolution the crank arm 92 will be raised and then lowered back to the position shown in Fig. 4. This action will cause the fingers 86 to be moved downwardly into the path of the sheets moving on the conveyor tapes 60 for a time sufficient to intercept one sheet and then move back to their inoperative position.

Shaft 96 is constantly driven at a predetermined speed through a chain of gears 97, which are rotated from the driven shaft 74, and has a rectangular-shaped coupling member 98 fixed on the outer end thereof. The rotating coupling member 98 is adapted to be operatively connected to the cam member 95 for half a revolution by means of a coupling key 100 which is slidably mounted in a suitable groove or keyway 102 provided in the cam 95 outside of the cam groove 94. A spring 104 mounted in the keyway 102 normally urges the coupling key 100 outwardly and into coupling engagement with a suitable shoulder 106 provided on the end of the coupling member 98. However, said coupling key 100 is provided with an outwardly projecting pin 108 which is adapted to be engaged by a cam surface 110 provided on inwardly projecting shoulders 112 formed at each end of a slidable rectangular-shaped actuating member 114. Engagement of the pin 108 by the cam surface 110 holds the coupling key 100 in an inoperative position so that the cam 95 remains stationary.

Actuating member 114 is slidably mounted on the inner face of a housing 116 attached to the side frame 24 and enclosing the cam 95, coupling member 98 and their associated parts. For this purpose, elongated slots 118 are provided in the actuating member 114 and receive guide members 120 attached to suitable shoulders provided on the inside surface of the housing 116 and arranged so that said actuating member may be moved either to the right or to the left with a sliding movement by means of a suitable eccentric connection or crank pin 122. The eccentric crank pin 122 is mounted on the inner end of a stub shaft 124 which extends through the outer wall of the housing 116 and has a crank arm 126 mounted on the outer end thereof. The construction and arrangement of the parts are such that by moving the crank arm 126 in a clockwise direction through an arc of about 90° (Fig. 4), the actuating member 114 will be moved to the left a sufficient distance to cause the cam surface 110 to release the pin 108 and permit the coupling key 100 to move downwardly into the path of the rotating coupling member 98. Such movement of the actuating member 114 simultaneously moves the opposite shoulder 112 into a position where its cam surface 110 will engage the pin 108 when the cam 95 is rotated half of a revolution. Thus, the released coupling key 100 will be contacted by the rotating coupling member 98 and effect an engagement of the cam 95 and cause it to rotate until the pin 108 contacting the other cam surface 110 moves the coupling key 100 to its inoperative position. In order to prevent the cam 95 from continuing rotation after its release from the coupling member 98, said cam member 95 may be provided with a suitable external brake 128, if desired.

From the foregoing description, it will be understood that each time the attendant wishes to inspect one of the blanks B moving along the conveyor C¹, he merely has to move the crank handle 126 either to the right or to the left de-

pending upon the position in which it was left after its last actuation. This effects the above described movement of the actuating member 114 so as to cause the cam 95 to rotate half of a revolution. As mentioned above, this causes the intercepting fingers 86 to be moved downwardly into the path of the blanks B. The speed of rotation of the shaft 96 through the gears 97 is such that the intercepting fingers 86 will remain in their downward sheet intercepting position only long enough to intercept one blank B and will then be moved back to their inoperative position. The intercepted blank will be fed into the receiving member 80 from which it may be removed to the receiving table 84 by raising the receiving member 80 on its pivotal mounting by means of the handle 83.

Referring again to Fig. 1, it will be observed that the individual blanks B carried by the conveyor C¹ are fed by the conveyor tapes 60 between the cooperating surfaces of a driven gripper drum 130 having a shaft 131 and a feed roller 132 having a shaft 133 for subsequent release upon the accumulating conveyor M¹ and delivery to the vertically disposed elevator stack E¹. As best shown in Figs. 7 and 8, the gripper drum 130 is provided with a large driving gear 134 on one side thereof and is moved at a speed somewhat less than the increased surface speed of the conveyor C¹ by means of a cooperating gear 135 mounted on a stub shaft 136 and driven from the main drive shaft 54 by means of cooperating miter gears 137. It is desirable to have the drum rotate at a surface speed less than the conveyor tapes 60 so that the leading edge of each blank B will be fed into contact with a plurality of stopping and aligning pins 139 before reaching the feed roller 132, such pins insuring a straightening of the blank and proper positioning thereof for gripping as described below. The roller 132 has its shaft journaled in suitable supporting arms 138 attached to the side frames 24 and, as indicated in Fig. 8, may be provided with a driving gear 140 which also meshes with the gripper drum gear 134.

Depending upon the size and surface speed of the gripper drum 130, said drum is provided with a plurality of rows of gripper fingers 141 mounted upon rotatable shafts 142 (Fig. 10) which are disposed in suitable grooves provided in the drum adjacent the aligning pins 139, and may be journaled in the side walls of the drum. Each shaft 142 is provided with a suitable crank arm 143 carrying a cam roller 144 which cooperates with suitable cams 145 carried by one of the side frames 24 as shown in Fig. 8. A spring 143A attached between the gripper drum and the crank arms 143 normally holds the gripper fingers in gripping engagement, whereas the cams act to move the crank arms against the tension of the springs so as to hold the gripper fingers 141 in their open position. The placing and shape of the cams 145 are such that each row of gripper fingers 141 will normally be held in open non-gripping position for approximately one half a revolution of the drum (extending from a position adjacent the elevator E¹ to a position somewhat beyond the roller 132) and then the associated roller 144 will be released from the cam and cause the gripper fingers to move into gripping engagement with the blank which has its leading edge in contact with the aligning pins 139. This latter action takes place beyond the feed roller 132 which acts to hold the blank in proper position as gripping takes place; and I

prefer to have the cam 145 shaped so as to allow an easy and slow gripping action in the first few inches of travel beyond the roller 132. When the leading edge of the blank reaches a predetermined position above the accumulator conveyor M¹ (actually adjacent the stripper fingers 201 described hereinafter), the cam 145 will rather abruptly engage the roller 144 and thus cause the gripper finger to be moved out of gripping engagement with the blank and thereby release the leading edge thereof. As this occurs, the rearward edge of the blank may be continued to be held in cooperative engagement with the gripper drum by means of a roller 146 which is suitably positioned in proper position at the side of the drum. For accumulating different sizes of blanks, the roller 146 for holding the rearward edge of each blank may be adjustably mounted in suitable slots 147 provided in the side frames or may be mounted on movable arms for that purpose. The actual stripping of the blanks from the drum and feeding of them from the accumulator conveyor M¹ into the elevator E¹ will be described hereinafter.

Accumulator conveyor M¹, in the form shown herein, consists of four cooperating sets of conveyor tapes 148, 150, 151, and 152 which pass about suitable guide rollers 153, 154, 155, 156, and 157 and may be maintained in proper taut condition by means of a plurality of slack take-up rolls 158. In the drawings, it will be noted that the rollers 153, 154, 155, 156, and 157 are so arranged that the cooperating conveyor tapes form a substantially arcuate path which extends from a position beneath the gripper drum 130 and directly adjacent the elevator E¹ to a position at the side of said drum substantially opposite the holding roller 146 for the rearward edge of each blank, and with said gripper drum 130 form a somewhat wedge-shaped blank receiving space 160 into which the blanks are received in overlapping relation.

The desired overlapping relation of the blanks is caused by the fact that the accumulator conveyor M¹ is operating at a considerably slower surface speed than the gripper drum 130. As shown in Figs. 7 and 8, the lowermost roller 157 is mounted on a shaft 161 which is provided with a sprocket 162 on one end thereof outside of the side frame 24. A driving chain 163 operatively connects the sprocket 162 with a sprocket 164 mounted on a shaft 165 which is rotated at the desired reduced speed through a chain of gears 166 which in turn are driven from the shaft 132 of the gripper drum 130. Thus, as the individual blanks B are moved by the gripper drum and released by the gripper fingers 141 and the rear edge holding roller 146, they will drop upon the conveyor tapes 148, 150, 151 and 152 and there accumulate in overlapped relation and be fed to the elevator stacker E¹.

In the event that a blank is removed from the conveyor C¹ prior to being fed to the gripper drum, it will be apparent that the orderly overlapping of the blanks on the accumulator conveyor will be interrupted. To prevent any such interruption, I have provided means for stopping the operation of the accumulator conveyor M¹ periodically each time that a blank fails to be delivered to the gripper drum 130.

In Figs. 7, 8 and 9, it will be noted that the chain of gears 166 for driving the accumulator conveyor from the main shaft of the gripper drum includes an upper gear 167 rotatably mounted on a shaft 168. This shaft 168 has a clutch

170 mounted thereon and comprising a stationary driven plate 171 attached to the gear 167 and a slidably mounted cooperating driving plate 172 keyed upon said shaft 168 and having a collar 173 attached thereto. The clutch plates 171 and 172 are normally in operative driving engagement and through the gears 166 and 167 cause the accumulator conveyor M¹ to be continuously moved at the desired slow speed until the clutch plates are disengaged in a manner which will now be described.

As best shown in Figs. 7, 9 and 9A, a double cam 174 is mounted on the shaft 168 and includes a side face cam 175 which is adapted to permit a separation of the clutch plates, so as to stop the movement of the accumulator conveyor; and it also includes a cam 176 for effecting a periodic raising and lowering of a feeler roller 177 mounted at the top of the gripper drum on an arm 178 pivotally connected to a shaft 180 which extends between the side frames. The raising and lowering of the roller 177 is effected through a link 181 which is pivotally connected to the central portion of a crank arm 182 attached to a stub shaft 183, the outer end of said arm being connected by a link 183 with a cam roller arm 184 which is normally pressed into operative contact with the cam 176 by means of a spring 185. The shape and speed of rotation of the cam 176 are such that the feeler roller 177 will be raised and lowered once each time a blank B is fed to the gripper cylinder. Should one of the blanks be removed from the conveyor C¹ by the interceptor X and consequently not be fed to the gripper drum 130 when the feeler roller 177 is normally moved down into engagement therewith, said feeler roller 177 will drop below the cylinder surface into suitable grooves 186 provided in the surface of the gripper drum 130. This additional downward movement of the feeler roller 177 causes a corresponding further movement of the crank arm 182 and its associated stub shaft 183 which is rotatably mounted in the side frame 24 and has a stop or holding arm 187 fixed thereon.

Normally, holding member 187 engages a crank arm 188 mounted on a shaft 190 attached to the outside of the side frame 24 with suitable brackets 191. As best shown in Fig. 9, the lower end of shaft 190 has an actuating crank arm 192 mounted thereon and provided at its outer end with a roller 193 for engaging the cam 175 and a yoke 194 having operative engagement with the movable clutch plate collar 173. When the upper arm 188 is in its normal position as held by the holding member 187, it holds the clutch 170 in proper engagement through the yoke 194 for transmitting motion to the accumulator conveyor M¹. However, when the feeler roller 177 moves downward into the grooves 186 in the gripper drum 130, due to the removal of one of the blanks B from the conveyor C¹ or any unauthorized interruption in the feeding of said blanks, holding member 187 will be moved out of contact with arm 188 (Figs. 7 and 9A) and thus permit a spring 195 associated with arm 192 to move roller 193 into the path of the side faced cam 175. This will cause the movable plate 172 to move to the right and thus disengage it from the fixed driven plate 171; and as the shaft 168 continues to rotate said plate will reciprocate back and forth but will not effect complete engagement with the stationary plate until the holding member 187 again moves into engagement with the arm 188 upon raising of feeler 75

roller 177 due to the presence of blank B beneath it. It will be apparent from Figs. 9 and 9A that the high point of side face cam 175 is so shaped as to move the clutch into engaging position and that the holding member 187 merely acts to hold it in such position so that motion may be transmitted to the accumulator conveyor M¹. In this manner, whenever a blank fails to be delivered to the gripper drum, the feeler roller 177 and its associated chain of mechanism causes a disengagement of the clutch 170 and thereby stops the feeding movement of the conveyor belts of the accumulator conveyor M¹. However, as soon as blanks are again fed to the gripper drum, the clutch 170 will be re-engaged and thus cause the conveyor M¹ to start operation and continue its feeding of the overlapping blanks B into the elevator conveyor E¹.

As mentioned above, each of the multiple blanks B is held upon the surface of the gripper drum by the gripper fingers 141 until it reaches a position adjacent the elevator E¹. Actually, this position is a short distance to the left of a movable guide roller 200 (Fig. 7) cooperatively mounted above the roller 157, and the removal of each blank is effected by means of a plurality of resilient stripper fingers 201 which are formed on and curve upwardly from a guide plate 202. The construction and arrangement of the cam 145 are such that the roller 144 associated with the gripper fingers 141 will contact said cam immediately before the leading edge of the blank reaches the stripper fingers 201. Upon being released by the gripper fingers, each blank is carried downwardly by gravity and forwardly by the action of roller 146 so that it may be guided by the stripper fingers 201 of the guide plate 202 between the rollers 200 and 157 for feeding into the elevator E¹. Releasing of the rearward edge of the blank and gripping by the rollers 200 and 157 take place substantially simultaneously. The movable mounting of the roller 200 permits said roller to move upwardly to allow for increased thickness as the overlapped blanks continue to be fed thereto. It will be understood, however, that it may be preferable, where the thickness of the overlapped blanks is extreme, to have the shaft 161 of roller 157 mounted in pivotally movable arms so that it may move downwardly instead of the roller 200; and in such event, the chain drive for sprocket 162 will be made from an additional sprocket centered at the pivot point.

To insure the proper feeding of the blanks into the elevator E¹, I have provided an upwardly spring-pressed roller 198 mounted on arms 199 attached to and extending to the right of the shaft 161. This roller holds the blanks against the guide plate 202 and is of small diameter so as to reduce the distance of unsupported travel of each blank before it is dropped upon a tray 203 of the elevator E¹. Sail roller 198 is also positioned above and beyond a forward jogging plate 204 and thus prevents the rearward edge of each blank from contacting the plate 204 before it is dropped upon the pile on the tray 203. Movement of the jogger plate 204 causes the blanks to be pushed against a rearward jogging and stop plate 205 so that they may be jogged into a uniform pile on the tray 203.

At this point, it may be noted that the distance which each blank projects beyond another blank in its overlapping relation therewith is such that they may be properly jogged into a uniform pile without causing any interference or contact at

the edges or corners where waste material has been removed. It is for this reason that it is particularly important to stop the operation of the accumulator conveyor M¹ at any time that a blank fails to be delivered thereto at the proper spaced interval.

When the stack of blanks B which is continuously formed in the elevator E¹ reaches the desired predetermined height, the attendant may stop the operation of the delivery apparatus D¹ and cause the blanks B to be fed into the conveyor C² and passed to the delivery apparatus D². As shown in Fig. 11, this is accomplished in the construction shown by means of a plurality of interceptor fingers 220 mounted on a shaft 221 positioned between the roller 132 and a first roller 222 of the conveyor C² which extends in a substantially horizontal path to a roller 223 disposed adjacent the second delivery apparatus D². The interceptor fingers 220 are somewhat similar, both in their construction and mode of operation, to the interceptor fingers 86 which were described above in connection with the sheet interceptor X.

Referring to Figs. 11 and 12, it will be seen that the shaft 221 is provided with a downwardly extending crank arm 224 which is connected by a link 225 to the central portion of one arm 226 of a bell crank lever which is pivoted at 227 and has a cam roller 228 on the end of the other arm thereof. Cam roller 228 is adapted to ride in an internal groove 230 of a cam 231, which, with its associated operating mechanism, is substantially identical, except for the shape of the internal groove 230, with the cam 95 and half revolution clutch for actuating the interceptor fingers 86. That is, said cam has associated therewith a suitable clutch or actuating mechanism which may be operated by movement of a handle 232 so as to cause the cam 231 to be moved through half a revolution or 180°. However, the shape of the internal groove 230 is such that when this occurs, the interceptor fingers 220 will be moved downwardly through the crank arm 224, link 225, and bell crank lever 227, into the grooves 186 so that the blanks B passing beneath the roller 132 will not be gripped by the gripper fingers 141 and will be fed into the conveyor C²; and said interceptor fingers 220 will stay in this position until the handle 232 is moved back to its initial position to cause the cam 231 again to be moved through half a revolution and thus move the interceptor fingers 220 upwardly so that the blanks may be gripped by the gripper fingers 141 and delivered to the elevator E¹.

In the present instance, I have shown a manual control for the cam 231. However, it will be understood that, if desired, a suitable switch 233 (Fig. 1) could be provided beneath the elevator E¹ so that when it moved downwardly to a predetermined position, a circuit would be closed and cause energization of a solenoid 234 for effecting the desired movement of the handle 232 automatically.

When the interceptor fingers 220 move into sheet-intercepting position, it is desirable to prevent the gripper fingers 141 from closing to gripping position so that the blanks will surely be fed into the conveyor C². In Fig. 11, it will be noted that the upper left-hand end of cam 145 is pivoted at 235 and provided near the end thereof with a pin or roller 236 which is adapted to ride in a cam groove 237 formed in the upper end of bell crank lever arm 226. Thus, when the bell crank lever is moved by cam 230 to cause

sheet interceptor fingers 220 to be moved to intercepting position, the end of cam 145 will be moved upwardly about pivot 235 so as to hold the gripper fingers open until they pass well beyond the roller 132 and the operative ends of the interceptor fingers 220.

As shown in Figs. 11 and 12, the conveyor C² comprises two lined sets of conveyor tapes 241 and 242, respectively. The first set of tapes 241 extends from the roller 222 to a roller 243 which is positioned substantially midway between the two delivery apparatus D¹ and D². Said tapes 241 are then guided over suitable guide rollers 244 and a slack-take-up roller 245 and back to the first roller 222. The conveyor tapes 242 extend from a roller 246 positioned immediately adjacent the roller 243 and having a spring-pressed pressure roller 247 in operative contact therewith, to the roller 223. Said tapes then pass around guide rollers 248 and a slack take-up roller 250 and back to the roller 246. If desired, suitable guides 251 and 252 may be provided above the upper operative reaches of the conveyor tapes 241 and 242, respectively, as shown in Figs. 1, 1A and 11.

Both of the sets of conveyor tapes 241 and 242 may be driven directly from the drive shaft 54 which, due to the fact that the conveyors C¹ and C² are in different planes, may be constructed in at least two sections which are operatively connected by means of suitable gears 253. Rotative movement is transmitted from the shaft 54 through cooperating miter gears 254 to a stub shaft 255 which is journaled in the side frames 24. Gears 256 mounted on the stub shaft 255 and the shafts of the conveyor tape rollers 243 and 246 cause said rollers to be rotated at the desired surface speed.

It will be apparent that, by means of the conveyor C² described above, the blanks B will be fed from the roller 132 positioned above the gripper drum 130 to a gripper drum 260 having a shaft 261 journaled in the side frames 24, 24 and being identical in both construction and operation with the gripper drum 130 described above so as to feed the blanks B into the second accumulator conveyor M² and thence to the elevator E² which also may be identical with those described above. Any failure to deliver the blanks at their regular spaced intervals to the gripper drum 260 is detected by a feeler roller 262 which is identical with the feeler roller 177 described above and causes a stopping of the operation of the accumulator conveyor M² until another blank passes beneath said feeler roller 262.

When the blanks in the elevator E² reach a predetermined height, the collecting action at the delivery apparatus D¹ will again be started by movement of the handle 232 associated with the cam 231 causing the interceptor fingers 220 to be moved to inoperative position, as described above. This action may also be easily arranged to take place automatically by means of a suitable switch and solenoid similar to the switch 232 and solenoid 233.

It will be understood that when the delivery D¹ is again put into operation, all of the blanks then on the conveyor C² and accumulator conveyor M² should be fed into the elevator E² so that they may be removed by the attendant. However, as the last blank in the conveyor C² passes beneath the feeler roller 262, said roller would ordinarily drop into the grooves provided in the gripper drum 260 and cause the accumulator conveyor M² to

stop. In order to allow the conveyor M² to continue its operation until all blanks thereon are fed into the elevator E², I have provided a downwardly extending finger or arm 263 on the shaft associated with the rollers 262 or otherwise operatively connected to the arms supporting said rollers so that upon being moved to the left or in a clockwise direction, as shown in Fig. 11, the feeler rollers 262 will be moved out of the path of the blanks B. Such movement may be effected by means of an upward extension 264 provided on a lever arm 265 which is pivoted at 266 to the side frame 24 and has an operating handle 267 pivotally connected to its other end. A downward pulling of the operating handle 267 will thus move the feeler rollers 262 to an upper inoperative position so that the accumulator conveyor M² will continue operation. If desired, this action may also be arranged to take place automatically by a solenoid 268 which is provided in a suitable circuit with the switch associated with the elevator E² so that it will be energized at the same time that the handle 232 is moved when restarting operation of the gripper drum 130.

It is believed that the operation of the entire delivery apparatus will be understood from the foregoing description. However, for a more complete understanding of the invention, it may be desirable to give one specific example of the operating speeds of the various parts of the apparatus which are all driven in synchronism at predetermined speed ratios. For example, referring to Figs. 1 and 1A, if the web W moves through the printing apparatus P and the rotary cutter A at a speed of 600 feet per minute, the drive for all parts of the separating mechanism S up to the holding rollers 26 and 27 will also produce a surface speed of 600 feet per minute. However, the drive for the separating roller 35 and the conveyor C¹ is such that these parts will move at an increased surface speed of about 800 feet per minute. To insure the proper alignment of the separated blanks B against the aligning pins 139, the gripper drum will be operated at a surface speed of about 700 feet per minute. This ratio of eight to seven for the conveyor C¹ and gripper drum 130 surface speeds remains constant. To prevent damage to the blanks that are fed to the conveyor C², the first half thereof including the conveyor tapes 241 will be operated at the same speed as the gripper drum 130, in this instance 700 feet per minute. However, the latter half of the conveyor C² including the conveyor tapes 242 operates at the same surface speed as the conveyor C¹ (800 feet per minute) and the gripper drum 260 operates at the same surface speed as the gripper drum 130 (700 feet per minute) so that a speed ratio of eight to seven for the conveyor tapes 242 and gripper drum 260 is maintained.

While I have described one embodiment of the features of my invention, it will be understood that various changes may be made in the construction, and certain features may be employed without others, without departing from my invention or sacrificing any of its advantages.

What I claim is:

1. Apparatus for the purpose described comprising the combination of means for cutting a traveling web into blanks of predetermined configuration which are held together in web form by small tabs; means for separating multiple blanks of more than one blank in length from said web and feeding them forward in spaced relation; a rotating gripper drum for aligning

said blanks, gripping them and carrying them to a position for release; means for releasing said blanks and removing them from said gripper drum; conveyor means operating at a slower surface speed than said gripper drum for receiving the released and removed blanks in predetermined overlapping relation and feeding them in such overlapped relation; and means for receiving the overlapped blanks and arranging them in a substantially vertically aligned pile.

2. In an apparatus for separating and delivering multiple blanks of more than one individual blank in length from a web which has been cut into blanks of predetermined configuration which are held together by means of small uncut tabs, means for periodically holding the web at a point behind a transverse line of separation; means operating in timed relation with such holding means for pulling said web on the forward side of said transverse line of separation after a predetermined number of longitudinally aligned individual blanks have passed beyond such means so as to separate multiple blanks from said web; and means for delivering the separated multiple blanks into a substantially vertical pile.

3. A method of operating on a traveling web of material which comprises cutting said web into blanks of predetermined configuration which are held together by means of small uncut tabs; periodically holding said web behind a transverse line of separation after a plurality of the longitudinally aligned individual blanks have passed beyond the point where the periodic holding takes place; and pulling said web on the forward side of said transverse line of separation at the time of holding so as to separate a multiple blank from the web.

4. A method of operating on a traveling web of material which comprises cutting said web into blanks of predetermined configuration which are held together by means of small uncut tabs; periodically holding said web behind a transverse line of separation after a plurality of the longitudinally aligned individual blanks have passed beyond the point where the periodic holding takes place; periodically pulling said web on the forward side of said transverse line of separation at the time of holding so as to separate multiple blanks from the web; feeding the separated blanks in predetermined spaced relation to a conveyor; depositing the blanks upon the conveyor in uniform overlapping relation; and feeding the overlapped blanks to and arranging them in a uniform vertical pile upon a delivery tray.

5. In an apparatus for delivering blanks which have been cut and separated from a traveling web, first and second spaced elevator trays; means associated with each of said trays for feeding blanks thereto so that they may be jogged into a uniform vertical pile thereon; first and second gripper drums disposed adjacent each of said trays and its associated feeding means and adapted to grip blanks fed thereto at predetermined spaced intervals and deposit them in overlapping relation upon said feeding means; first conveyor means for feeding blanks in spaced relation to said first gripper drum; second conveyor means for feeding blanks from a position adjacent said first gripper drum to said second gripper drum; and means for preventing blanks from being gripped by said first gripper drum and leading them to said second conveyor means.

6. In an apparatus for delivering blanks which have been cut and separated from a traveling web, first and second spaced delivery trays; means associated with each of said trays for feeding blanks thereto so that they may be jogged into a uniform vertical pile thereon; first and second gripper drums disposed adjacent each of said trays and its associated feeding means and adapted to grip blanks fed thereto at predetermined spaced intervals and deposit them in overlapping relation upon said feeding means; first conveyor means for feeding blanks in spaced relation to said first gripper drum at a greater surface speed than that of said first gripper drum; and second conveyor means for feeding blanks from a position adjacent said first gripper drum to said second gripper drum, said second conveyor means including a first section adjacent said first gripper drum and operating at a surface speed substantially the same as that of said first gripper drum and a second section adjacent said second gripper drum and operating at a surface speed substantially the same as that of said first conveyor means.

7. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for aligning each blank as it is fed thereto by said feeding means, gripping said blank and carrying it to a position for release; means for releasing each blank and removing it from said gripper drum; conveyor means operating at a slower surface speed than said gripper drum for receiving the released and removed blanks in predetermined overlapping relation and feeding them in such overlapping relation; and means for receiving the overlapping blanks and arranging them in a substantially vertically aligned pile.

8. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for aligning each blank as it is fed thereto by said feeding means, gripping said blank and carrying it to a position for release; means for releasing each blank and removing it from said gripper drum; conveyor means operating at a slower surface speed than said gripper drum for receiving the released and removed blanks in predetermined overlapping relation and feeding them in such overlapping relation; and means for stopping the operation of said conveyor means each time that a blank fails to be fed to said gripper drum.

9. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding the blanks forward in spaced relation at a predetermined surface speed; a gripper drum disposed adjacent said feeding means; means for rotating said gripper drum at a predetermined surface speed less than the speed of said feeding means; conveyor means disposed adjacent said gripper drum and operating at a slower surface speed than that of said gripper drum; means associated with said gripper drum for gripping the leading edge of each blank as it is fed thereto by said feeding means; means for releasing said gripping means when the leading edge of the blank is in a predetermined position above said conveyor means; and means for holding the rearward edge of each blank against the surface of

said gripper drum until the leading edge thereof is released by said gripping means.

10. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding the blanks forward in spaced relation at a predetermined surface speed; a gripper drum disposed adjacent said feeding means; means for rotating said gripper drum at a predetermined surface speed less than the speed of said feeding means; conveyor means disposed adjacent said gripper drum and operating at a slower surface speed than that of said gripper drum; means associated with said gripper drum for aligning the leading edge of said blank as it is fed thereto; means associated with said gripper drum for gripping the leading edge of each blank after it has been aligned thereon; means for releasing said gripping means when the leading edge of the blank is in a predetermined position above said conveyor means; and means for holding the rearward edge of each blank against the surface of said gripper drum until the leading edge thereof is released by said gripping means.

11. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding the blanks forward in spaced relation at a predetermined surface speed; a gripper drum disposed adjacent said feeding means; means for rotating said gripper drum at a predetermined surface speed less than the speed of said feeding means; conveyor means disposed adjacent said gripper drum and operating at a slower surface speed than that of said gripper drum; means associated with said gripper drum for gripping the leading edge of each blank as it is fed thereto by said feeding means; means for releasing said gripping means when the leading edge of the blank is in a predetermined position above said conveyor means; and means for stopping the operation of said conveyor means each time that a blank fails to be fed to said gripper drum.

12. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding the blanks forward in spaced relation at a predetermined surface speed; a gripper drum disposed adjacent said feeding means; means for rotating said gripper drum at a predetermined surface speed less than the speed of said feeding means; conveyor means disposed adjacent said gripper drum and operating at a slower surface speed than that of said gripper drum; means associated with said gripper drum for gripping the leading edge of each blank as it is fed thereto by said feeding means; means for releasing said gripping means when the leading edge of the blank is in a predetermined position above said conveyor means; and means for stopping the operation of said conveyor means each time that a blank fails to be delivered to said gripper drum and starting the operation of said conveyor means again when the next blank is fed to said gripper drum.

13. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for gripping each blank as it is fed thereto by said feeding means and releasing each blank at a predetermined point in the rotation of said gripper drum; conveyor means for receiving the released blanks in predetermined overlapping relation and feeding them in such overlapped relation; means for op-

erating said conveyor means at a predetermined surface speed which is slower than the surface speed of said gripper drum; and means for stopping the operation of said conveyor means each time that a blank fails to be fed to said gripper drum, said last mentioned means comprising means for detecting the absence of each blank that fails to be fed to said gripper drum at its regular spaced interval, and means actuated by said detecting means for disconnecting the operating means for the conveyor each time that the detecting means detects the absence of a blank.

14. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for gripping each blank as it is fed thereto by said feeding means and releasing each blank at a predetermined point in the rotation of said gripper drum; conveyor means for receiving the released blanks in predetermined overlapping relation and feeding them in such overlapped relation; means for operating said conveyor means at a predetermined surface speed which is slower than the surface speed of said gripper drum; and means for stopping the operation of said conveyor means each time that a blank fails to be fed to said gripper drum, said last mentioned means comprising a feeler roller associated with the gripper drum and adapted to move to an operating position whenever a blank fails to be passed beneath it, and means actuated by said feeler roller for disconnecting the driving means for the conveyor.

15. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for gripping each blank as it is fed thereto and releasing it at a predetermined point in the rotation of said gripper drum; conveyor means operating at a slower surface speed than said gripper drum for receiving the released blanks in predetermined overlapping relation; means for receiving the overlapped blanks and arranging them in a substantially vertically aligned pile; and means for guiding the leading edges of the blanks as they are released from the gripper drum and feeding them toward such receiving and arranging means.

16. In an apparatus for delivering blanks which have been cut and separated from a traveling web, means for feeding said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for gripping each blank as it is fed thereto and releasing it at a predetermined point in the rotation of said gripper drum; conveyor means operating at a slower surface speed than said gripper drum for receiving the released blanks in predetermined overlapping relation; means for receiving the overlapped blanks and arranging them in a substantially vertically aligned pile; and means for guiding the leading edges of the blanks as they are released from the gripper drum and feeding them toward such receiving and arranging means, said last mentioned means including means for reducing the unsupported length of travel of each blank as it is fed into said receiving and arranging means.

17. In an apparatus for delivering blanks

which have been cut and separated from a traveling web, a first feeding means for moving said blanks forward in spaced relation at a predetermined speed; a rotating gripper drum for gripping each blank as it is fed thereto and releasing it after said gripper drum rotates to a predetermined position; conveyor means operating at a slower surface speed than said gripper drum for receiving the released blanks in predetermined overlapping relation and feeding them in such overlapping relation; means for removing individual blanks from said first feeding means; and means for stopping the operation of said conveyor means each time that an individual blank is removed from said feeding means.

18. In an apparatus for feeding blanks including a plurality of endless tapes for carrying the blanks through a predetermined path, means for removing a blank from the tapes, comprising a plurality of interceptor fingers, and means for moving said interceptor fingers into the path of the blanks and automatically moving said fingers out of the path of the blanks after a predetermined time interval.

19. Apparatus for rotating a member movably mounted on a rotating shaft through one half a revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by one of said members; and means for holding and actuating said connecting means, said holding and actuating means being movable to two positions in each of which the connecting means will be held in inoperative position, the movement from one position to another actuating the connecting means so as to cause said two members to be interconnected for one half a revolution of said shaft.

20. A method of continuously operating on a traveling web of material, which comprises cutting said web into sheets, feeding said sheets forward at a predetermined speed, aligning each sheet at a predetermined point in its travel, gripping each aligned sheet and carrying it to a position for release, releasing the gripped sheets and depositing them upon a conveyor in uniform overlapping relation, and feeding the overlapped sheets to and arranging them in a uniform vertical pile.

21. In an apparatus for delivering sheets which have been cut from a traveling web, means for feeding said sheets forward at a predetermined speed; a rotating gripper drum adjacent said feeding means; means associated with said gripper drum for aligning the leading edge of each sheet as it is fed thereto and gripping said edge after alignment so that it may be carried to a position for release; means for releasing each sheet and removing it from said gripper drum; conveyor means for receiving the released and removed sheets in predetermined overlapping relation and feeding them in such overlapping relation; and means for receiving the overlapped sheets and arranging them in a substantially vertically aligned pile.

22. In an apparatus for delivering sheets which have been cut from a traveling web, means for feeding the sheets forward in spaced relation at a predetermined speed; a gripper drum disposed adjacent said feeding means; means for rotating said gripper drum at a predetermined surface speed less than the speed of said feeding means; conveyor means disposed adjacent said gripper drum and operating at a slower surface

speed than that of said gripper drum; means associated with said gripper drum for aligning the leading edge of each sheet as it is fed thereto; means associated with said gripper drum for gripping the leading edge of each sheet after it has been aligned thereon; means for releasing said gripping means when the leading edge of the sheet is in a predetermined position above said conveyor means so that the sheets will be deposited in overlapping relation thereon; and means for receiving the overlapped sheets and arranging them in a substantially vertically aligned pile.

23. In an apparatus for feeding sheets or blanks including a plurality of endless tapes for carrying the sheets through a predetermined path, means for removing a sheet from the tapes, comprising feeding means cooperating with said tapes, a sheet-receiving member positioned adjacent said feeding means, a plurality of interceptor fingers, and means for moving said interceptor fingers into the path of the sheets so that the feeding means will move a sheet into said sheet-receiving member.

24. In an apparatus for feeding sheets or blanks including a plurality of endless tapes for carrying the sheets through a predetermined path, means for removing a sheet from the tapes, comprising feeding means cooperating with said tapes, a sheet-receiving member positioned on one side of said feeding means, a sheet-receiving tray positioned on the other side of said feeding means, a plurality of interceptor fingers, means for moving said interceptor fingers into the path of the sheets so that said feeding means will feed a sheet into said receiving member, and means for moving said sheet-receiving member so that the sheets may be transferred to said sheet-receiving tray.

25. In an apparatus for feeding sheets or blanks including a plurality of endless tapes for carrying the sheets through a predetermined path, means for removing a sheet from the tapes, comprising feeding means cooperating with said tapes, a sheet-receiving member positioned on one side of said feeding means, a sheet-receiving tray positioned on the other side of said feeding means, a plurality of interceptor fingers, means for moving said interceptor fingers into the path of the sheets so that said feeding means will feed a sheet into said receiving member, and means for moving said sheet-receiving member to a position in which a received sheet will slide by gravity to said feeding means and there be moved to said sheet-receiving tray.

26. Apparatus for rotating a member movably mounted on a rotating shaft through one half a revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by one of said members and movable to an operative connecting position; resilient means for urging said connecting means toward its operative connecting position; and means for holding said connecting means in inoperative position, such holding means being movable to a position in which said connecting means will be released and permit the two members to be interconnected for one half a revolution of said shaft.

27. Apparatus for rotating a member movably mounted on a rotating shaft through one half a revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by the member to be rotated and movable to an op-

erative position in which the member to be rotated will be interconnected with said coupling member; and means for holding and actuating said connecting means, such holding and actuating means being movable between two positions in each of which said connecting means will be held in inoperative position, the movement from one of said two positions to the other actuating said connecting means so as to cause said two members to be interconnected for one half a revolution of said shaft.

28. Apparatus for rotating a member movably mounted on a rotating shaft through a predetermined angle of revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by one of said members and movable to an operative position in which said members will be interconnected for rotation in unison; resilient means for continuously urging said connecting means toward said operative position; means for holding said connecting means in inoperative position; and means for releasing such holding means so as to permit said connecting means to interconnect said members.

29. Apparatus for rotating a member movably mounted on a rotating shaft through a predetermined angle of revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by the member to be rotated and movable to an operative position in which the member to be rotated will be interconnected with said coupling member; resilient means for continuously urging said connecting means toward said operative position; and actuating means for said connecting means, said actuating means having cam means mounted thereon in position normally to hold said connecting means in inoperative position.

30. Apparatus for rotating a member movably mounted on a rotating shaft through a predetermined angle of revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by the member to be rotated and movable to an operative position in which the member to be rotated will be interconnected with said coupling member; resilient means for continuously urging said connecting means toward said operative position; and actuating means for said connecting means, said actuating means being movable between first and second operating positions and having first and second cam means mounted thereon and adapted and positioned to hold said connecting means in inoperative position when the actuating means is in said first and second operating positions, respectively, movement of said actuating means from said first operating position to said second operating position acting to release said first cam means from said connecting means and move said second cam means into the path of movement of said connecting means.

31. Apparatus for rotating a member movably mounted on a rotating shaft through a predetermined angle of revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by the member to be rotated and movable to an operative position in which the member to be rotated will be interconnected with said coupling member; resilient means for continuously urging said connecting means toward said operative position; a housing for the afore-

mentioned means; actuating means slidably mounted on said housing and movable between first and second operating positions; a first cam means mounted adjacent one end of said actuating means and adapted to hold said connecting means in inoperative position when said actuating means is in said first position; and a second cam means mounted adjacent the other end of said actuating means and adapted to hold said connecting means in inoperative position when said actuating means is in said second position, movement of said actuating means from said first position to said second position releasing said first cam means from said connecting means and moving said second cam means into the path of said connecting means.

32. Apparatus for rotating a member movably mounted on a rotating shaft through a predetermined angle of revolution of said shaft, comprising a coupling member fixed on said shaft adjacent the member to be rotated; connecting means carried by the member to be rotated and movable to an operative position in which the

member to be rotated will be interconnected with said coupling member; resilient means for continuously urging said connecting means toward said operative position; a housing for the aforementioned means; actuating means slidably mounted on said housing and movable between first and second operating positions; a first cam means mounted adjacent one end of said actuating means and adapted to hold said connecting means in inoperative position when said actuating means is in said first position; a second cam means mounted adjacent the other end of said actuating means and adapted to hold said connecting means in inoperative position when said actuating means is in said second position, movement of said actuating means from said first position to said second position releasing said first cam means from said connecting means and moving said second cam means into the path of said connecting means; and means mounted on said housing for moving said actuating means from said first position to said second position.

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