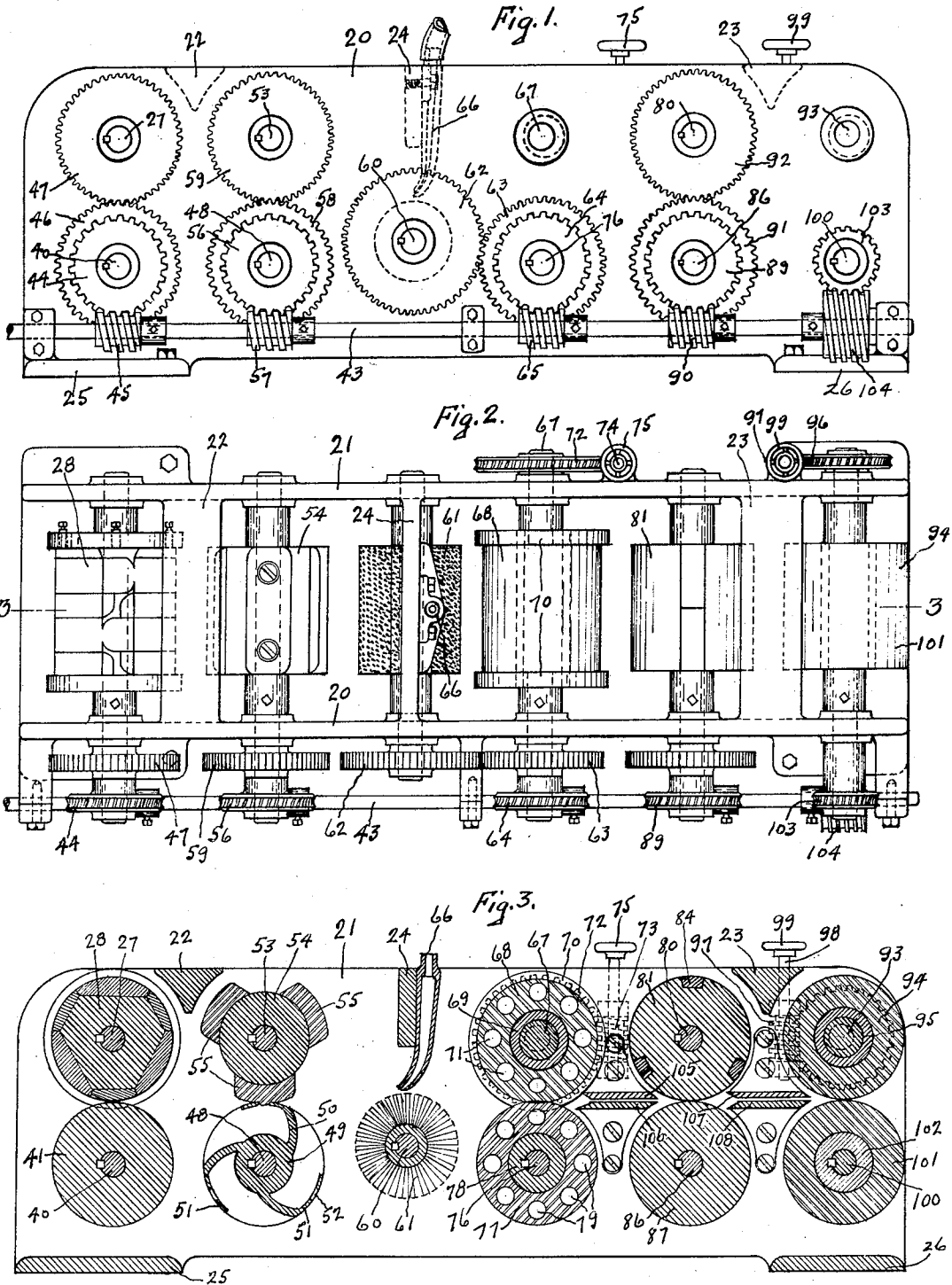


W. FUHR.
 BLANK CUTTING MACHINE.
 APPLICATION FILED JAN. 23, 1922.

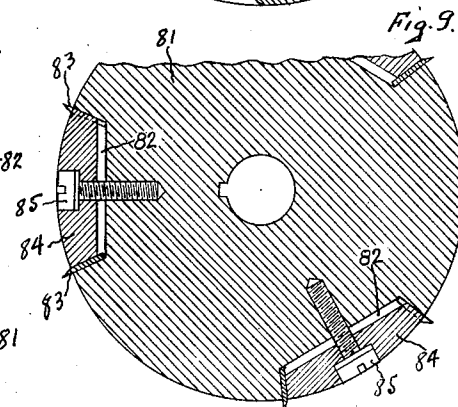
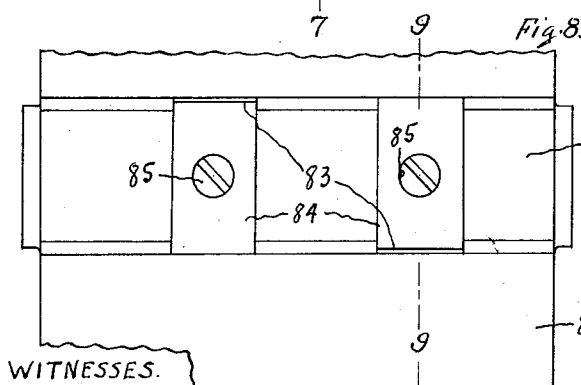
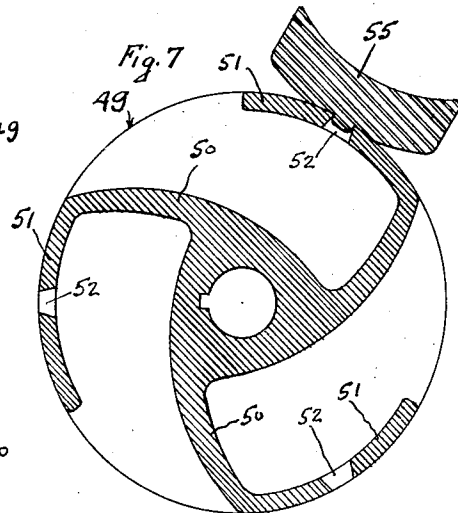
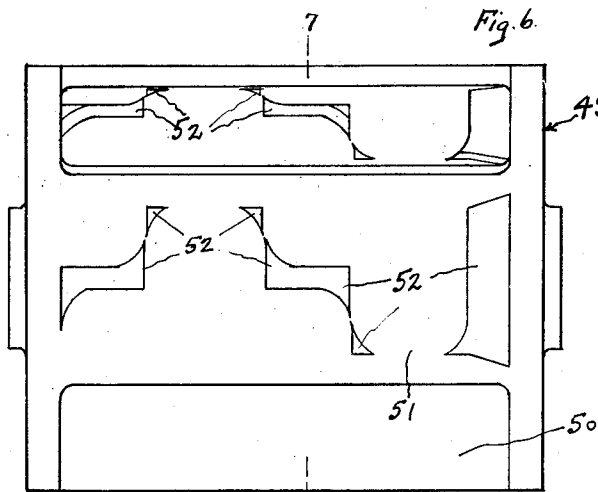
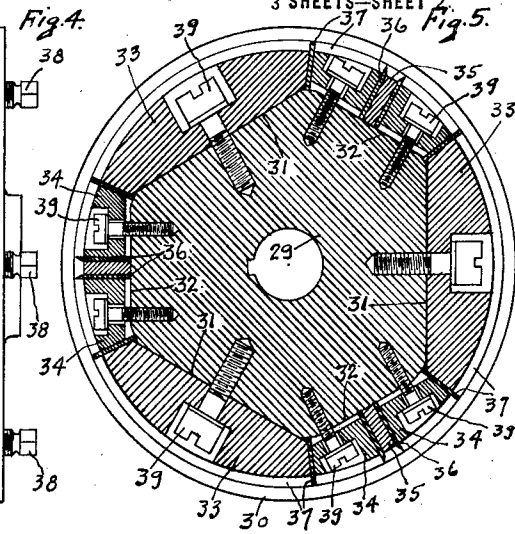
1,428,952.

Patented Sept. 12, 1922.

3 SHEETS—SHEET 1.



1,428,952.

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WITNESSES.

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3 SHEETS—SHEET 3.

Fig. 10.

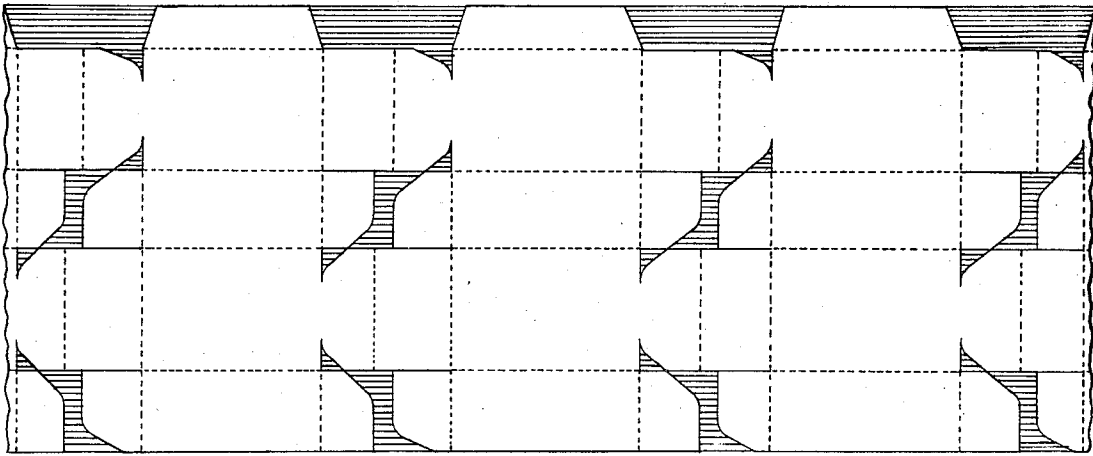
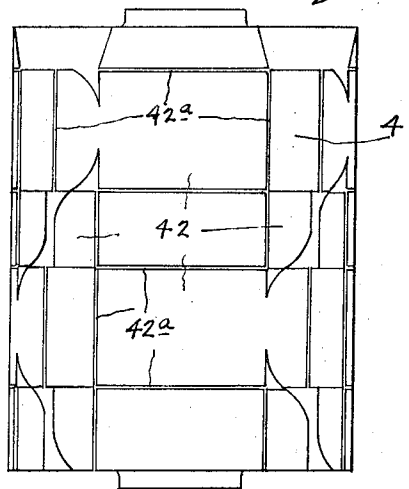


Fig. 11.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM FUHR, OF CHICAGO, ILLINOIS.

BLANK-CUTTING MACHINE.

Application filed January 23, 1922. Serial No. 531,045.

To all whom it may concern:

Be it known that I, WILLIAM FUHR, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Blank-Cutting Machines, of which the following is a specification.

This invention relates to a machine for cutting, creasing, trimming and brushing carton, box, or pail blanks from either printed or plain roll stock by a continuous, non-stop, rotary motion.

The purpose of the invention is to provide a construction for a machine that will make blanks from roll stock and deliver them, finished in every respect, to a gluing, folding or tapering machine, or any suitable receptacle, at a maximum speed and with minimum scrap or waste.

The main feature of the invention resides in the construction and mode of operation of the cutting and creasing device, being fashioned somewhat on the same principle as the cutting and creasing device of a bed and cylinder press, as far as the blank is concerned, but further, is capable of making blanks of irregular outlines and curves with the same facility. The cutting blades are solidly backed and rigidly locked, and are readily removable singly.

Another feature of the invention resides in the means for trimming and disposing of the scrap or waste material. This trimming device is positive acting, even though a clean cut has not been obtained.

Other novel features of the invention are the means for cleaning the blanks of all fuzz and dust, consisting of both an air and a hair brush, and the means for adjusting the feed rolls so as to keep the operation of the cutting and creasing device in correct relation to the printing.

In the machine about to be described in connection with the accompanying drawings, the several features mentioned have been combined in a single device, whereby the several operations are carried on successively and in close cooperation with each other.

In the accompanying drawings, Figure 1 is a side elevational view of the machine embodying the invention,

Figure 2 is a top plan view of the machine,

Figure 3 is a view in longitudinal section taken on line 3—3 of Figure 2,

Figure 4 is an enlarged view in elevation of the cutting and creasing roll,

Figure 5 is a cross-sectional view of the same taken on line 5—5 of Figure 4,

Figure 6 is an enlarged view in elevation of the trimming roll,

Figure 7 is a cross-sectional view of the trimming roll taken on line 7—7 of Figure 6, with a single rubber pad of its counter-roll in position to show manner of operation,

Figure 8 is a fragmentary view in elevation of the cut-off roll,

Figure 9 is a cross-sectional view of the cut-off roll taken on lines 9—9 of Figure 8,

Figure 10 shows a strip of blanks after they have passed the cutting and creasing device, trimming roll, but before reaching the cut-off roll. The dotted lines indicate the creasing and the shading indicates the scrap material which has been removed by the trimming roll,

Figure 11 shows a plan view of the counter-roll for the cutting and creasing device with packing sheets in position.

Referring now more specifically to the drawings, the moving parts of the machine are supported in a rigid frame consisting of a pair of parallel upright walls 20 and 21, held together by cross-pieces 22, 23 and 24, and floor plates 25 and 26.

Between the walls of the frame are mounted a series of rolls and corresponding counter rolls, arranged longitudinally from end to end of the frame, and in the order in which their respective operations are carried out. It is understood that the stock from which the blanks are formed is fed into the machine from the left end thereof (Figure 1) between the first rolls, and thence through the following rolls in substantially a straight line.

In order to simplify the description, the several parts of the machine will be described separately and in order as follows:

Cutting and creasing.—Rotatably mounted between the walls 20 and 21 is the shaft 27 (Figures 4 and 5), carrying a rigidly mounted die-roll 28. This roll comprises a cylindrical body with flanges 30, the said flanges serving as guides for the stock, Figures 4 and 5. The said body 29 is generally hexagonal in cross-sectional contour, having alternate long and short flat surfaces 31 and 32, two adjacent surfaces car-

rying blades for operation upon a single blank, as will hereinafter be described. The drawings show a three blank arrangement; that is, one revolution of the roll makes three blanks. A plurality of panel blocks 33 with their longitudinal sides tapered towards the center of the roll, are mounted on the flat surfaces 31. A plurality of flap blocks 34, their outer ends similarly tapered, and scrap blocks 35, are mounted on flat surfaces 32. A set of cutting blades 36 and creasing blades 37 are arranged between said blocks, the whole being locked longitudinally by set screws 38 extending laterally through one of the flanges 30, which lock the said blocks and blades against the opposite flange. The circumferential locking of the blocks is obtained by screws 39 which draw the blocks toward the center of the roll. The cutting blades are transversely and longitudinally of the roll, although portions thereof are irregular and curved in contour and spaced apart or notched at certain points in order to provide connections between the blanks, to be severed later by the cut-off roll as hereinafter described as well as to partially connect the waste portions, so that they will be carried on with the blanks, and not become lodged between the cutting blades. Rotatably mounted between the walls 20 and 21, directly underneath the shaft 27, is the shaft 40, carrying a rigidly mounted counter roll 41, Figure 11, which in turn carries packing sheets 42, forming channels 42^a adapted to register with the creasing blades 37. The channels 42^a may also be cut in the surface of the roll, if preferred. This counter roll receives its power from a main drive shaft 43 by means of the worm gear 44 and worm 45, Figure 1, and transmits power to the cutting and creasing roll, or die roll, by means of gears 46 and 47. This main shaft, it will be observed, extends longitudinally of the frame, and delivers power to all of the rolls.

Trimming.—Rotatably mounted between the walls 20 and 21 is the shaft 48 carrying a rigidly mounted trimming roll 49 which is provided with a set of offset spokes 50 and face pieces or sectors 51. By set is meant three, there being three blanks presented to a roll during one revolution as before explained. The face pieces are provided with tapered slots 52 corresponding with the location of the cut-out portions of the blank or scrap material. Rotatably mounted between the walls 20 and 21, directly over shaft 48, is the shaft 53 carrying a rigidly mounted counter roll 54, which in turn carries a set of rubber pads 55. The said rubber pads co-operate with the face pieces 51 to apply a positive pressure upon the waste portions, in order to break the same away from the blanks at the unsevered points. By this pressure the waste material is forced

through the slots 52 in the trimming roll, from whence it is thrown out through the openings between the face pieces by the spokes 50, Figures 6 and 7. The trimming roll 40 is driven from the main drive shaft 43 by means of worm gear 56 and worm 57, Figure 1, and drives its counter roll 54 by means of spur gears 58 and 59.

Brushing.—Rotatably mounted between the walls 20 and 21 is the shaft 60 carrying a rigidly mounted circular brush 61, which travels in the opposite direction from that of the stock material. It receives its power from the main drive shaft 43 by means of gears 62 and 63, worm gear 64 and worm 65, Figure 1. Rigidly mounted on cross-piece 24 located directly over the brush 61 is an air nozzle 66 through which a stream of air is directed downwardly against the upper surface of the passing blanks (Figure 3), the said blanks passing between the brush and the air-nozzle.

Feeding and regulating.—Journaled between the walls 20 and 21 is an eccentric shaft 67 upon which is rotatably mounted a rubber roll 68 having a metal bearing sleeve 69 and flanges 70, the said flanges serving as guides for the stock. The rubber roll is provided with a plurality of longitudinal cavities 71, the purpose of which is to take up the bulge in the rubber when the surface is depressed, and thus decrease the circumference of the said roll. Surface indentations or corrugations would serve just as well as the said cavities. The increase and decrease in the circumference of the roll causes the stock material to advance or back-up, as the preceding rolls, viz: die and trimming, have a pulling contact on the stock material only throughout a portion of their circumferences. These regulating feed rolls are quite necessary in the cutting of printed blanks, particularly when the printing is carried on independently of the cutting machine, otherwise the cumulative effect of the slightest variations between printing and cutting is quite pronounced unless controlled by the regulating means. The degree of depression and expansion of the said rubber roll is regulated by the turning of the eccentric shaft 67 by means of a worm gear 72, worm 73, stem 74 and hand wheel 75 (Figures 2 and 3), which forces it against its counter roll, now to be described.

Rotatably mounted between the walls 20 and 21 is the shaft 76 carrying a rigidly mounted rubber counter roll 77 having a metal sleeve 78, and is provided with a plurality of cavities 79, like those in roll 68, and for the same purpose, Figure 3. This counter roll receives its power from the main drive shaft 43 by means of the worm gear 64 and worm 65, and transmits power to the roll 68 by friction contact through the stock

material. These rolls are so arranged that at the lightest possible adjustment they grip the stock material securely enough to eliminate all chance of slipping.

5 *Cutting off.*—Rotatably mounted between the walls 20 and 21, immediately beyond the feeding rolls, is a shaft 80, carrying a rigidly mounted cut-off roll 81 (Figures 8 and 9). This roll is provided with a set of longitudinal channels 82 with sides tapered to the center of roll. Cutting blades 83 are arranged within the said channels and are locked in position by the blocks 84 and screws 85. Journalled beneath the roll 81 is a shaft 86 carrying a rigidly mounted counter roll 87. This counter roll receives its power from the main drive shaft 43 by means of the worm gear 89 and worm 90, and transmits power to the cut-off roll by means of gears 91 and 92.

20 *Separating.*—Located beyond the cutting-off rolls and mounted in the same manner as the other rolls is an eccentric shaft 93 carrying a rotatably mounted rubber roll 94 with a metal bearing sleeve 95. This roll is adjustable and can be made to exert more or less pull on the blanks by means of the eccentric shaft 93, worm wheel 96, worm 97, stem 98 and hand wheel 99 (Figures 2 and 3). Rotatably mounted between the walls 20 and 21 is the shaft 100 carrying a rigidly mounted rubber counter roll 101 having a metal sleeve 102. This counter roll receives its power from the main drive shaft 43 by means of the worm gear 103 and worm 104, and transmits power to the roll 94 by frictional contact.

The purpose of this separating device is to assure a separation of the blanks in case a clean cut-off has not been obtained, and also to discharge the blanks with an intermittent action, such as would be desirable if the blanks are to be fed into an intermittently acting machine for folding or otherwise treating the blanks. It is to be observed that the so-called separating rolls 94 and 101 are driven at a greater speed than the other rolls, thus making possible the intermittent discharge of the blanks.

50 The worms 45, 57, 65, 90 and 104 are adjustable so as to keep the operation of the different rolls in correct relation to one another.

Guide plates 105 and 106, between which the blanks travel, are arranged between the feed and cut-off rolls, Figure 3. Similar guide plates 107 and 108 are arranged between the cut-off and separating rolls.

60 The operation of the machine is readily understandable from the preceding description, it being clear that the paper stock is fed from a roll or other source of supply, continuously into the machine, where it is successively cut into blanks and the same

trimmed, cleaned, severed, separated and discharged in the manner already set forth.

The advantages of the machine reside not only in the novel arrangement of the several types of rolls, but also in the construction and nature of each roll for accomplishing its particular function. For instance, the initial cutting or blanking rolls are novel in structure as regards the method of mounting the blades, permitting each blade or number of blades to be removed or adjusted without disturbing the others.

The particular features herein set forth may be variously modified in arrangement and structure, without departing from the spirit of the invention, and, therefore, it is to be understood that the invention is not limited to the present disclosure, except in so far as such limitation is expressed in the appended claims.

I claim as my invention:

1. In a cutting machine of the character described, the combination of rotary cutting rolls comprising a series of blades removably secured to the face of one of said rolls, acting to cut interconnected blanks from stock fed continuously therebetween, cutting-off rolls beyond said cutting roll for severing the blanks from each other, and blank cleaning mechanism comprising a rotary brush operating on said blanks subsequent to the cutting operation.
2. In a cutting machine of the character described, the combination of rotary cutting rolls, for cutting blanks from stock fed continuously therebetween, and to partially sever the waste material and rolls beyond said cutting rolls for removing the waste material from the blanks in the passage of the same between said cutting rolls.
3. In a cutting machine of the character described, the combination of rotary cutting rolls for cutting interconnected blanks and partially severed waste portions from stock fed therebetween, waste material removing rolls beyond said cutting roll, comprising a counter roll having a resilient surface.
4. In a cutting machine of the character described, the combination of cutting rolls, adapted to cut blanks in partially severed condition from stock fed continuously between said rolls, waste material removing rolls, cutting-off rolls for completely severing said blanks, separating rolls driven at an increased speed for insuring the separation of said blanks and for discharging said blanks intermittently from the machine, and driving mechanism for said rolls.
5. In a cutting machine of the character described, the combination of rotary cutting rolls for cutting interconnected blanks from stock fed therebetween, and waste material removing rolls beyond said cutting roll comprising a perforated roll adapted to register

with the waste portions to be removed and a counter roll having a yieldable surface whereby the waste portions are forced through said perforated roll.

5 6. In a cutting machine of the character described, the combination of cutting rolls adapted to cut interconnected blanks and waste portions from stock fed continuously between said rolls, and waste material removing rolls comprising a hollow roll having perforations adapted to register with the waste portions and a counter roll provided with a surface of resilient material, acting to force the waste portions through
10 said perforations.

15 7. In a cutting machine of the character described, the combination of blank cutting rolls comprising cutting blades on the surface thereof adapted to cut and partially sever blanks from stock continuously fed between said rolls, cutting-off rolls for severing the blanks and separating rolls to be driven at greater speed than said cutting-off rolls.

20 8. In a cutting machine of the character described, the combination of cutting rolls adapted to cut blanks interconnected along lines of partial severing from stock fed continuously between said rolls, feed regulating rolls comprising yieldable surfaces, means for regulating the pressure exerted on the blanks by said rolls, and separating rolls driven at an increased speed for separating said blanks along the lines of partial
25 severing.

30 9. In a cutting machine of the character described, the combination of rotary cutting and creasing rolls adapted to cut interconnected blanks from stock continuously fed therebetween, and to partially sever waste portions to be removed, rolls comprising co-acting perforated and yieldable surfaces adapted to register with said waste portions, a rotary brush mounted in the path of the
35 cut blanks, an air nozzle directed against

the surface of the blanks, feed regulating rolls, cutting-off rolls and separating rolls, all of said rolls acting successively on said blanks substantially as and for the purpose described.

50 10. In a cutting machine of the character described, the combination of cutting rolls, feed regulating rolls of yieldable material, one of said rolls being eccentrically mounted, and means for axially adjusting said
55 last mentioned roll, and driving means for imparting uniform rotation to said cutting and feed regulating rolls.

11. In a cutting machine the combination of cutting rolls, feed regulating rolls beyond
60 said cutting rolls, and driven at the same speed, said feed rolls being of compressible material, and one of said feed rolls being mounted for adjustment about on eccentric axis of rotation.

65 12. In a cutting machine the combination of cutting rolls, for cutting interconnected blanks from stock continuously fed between said rolls, feed regulating rolls beyond said cutting rolls, and comprising cylindric
70 members of resilient material, one of said rolls being eccentrically journaled, and means for adjusting the eccentricity of said roll.

75 13. In a cutting machine of the character described, the combination of cutting rolls adapted to cut interconnected blanks from stock continuously fed therein between, and to partially sever waste portions to be removed, trimming rolls adapted to remove
80 said waste portions, and rotary brush mounted in the path of the cutting blanks beyond said trimming rolls, an air nozzle directed against the surface of the blanks, and means for driving said rolls at a uni-
85 form speed.

In witness whereof, I hereunto subscribe my name this 14th day of January, A. D., 1922.

WILLIAM FUHR