

May 23, 1967

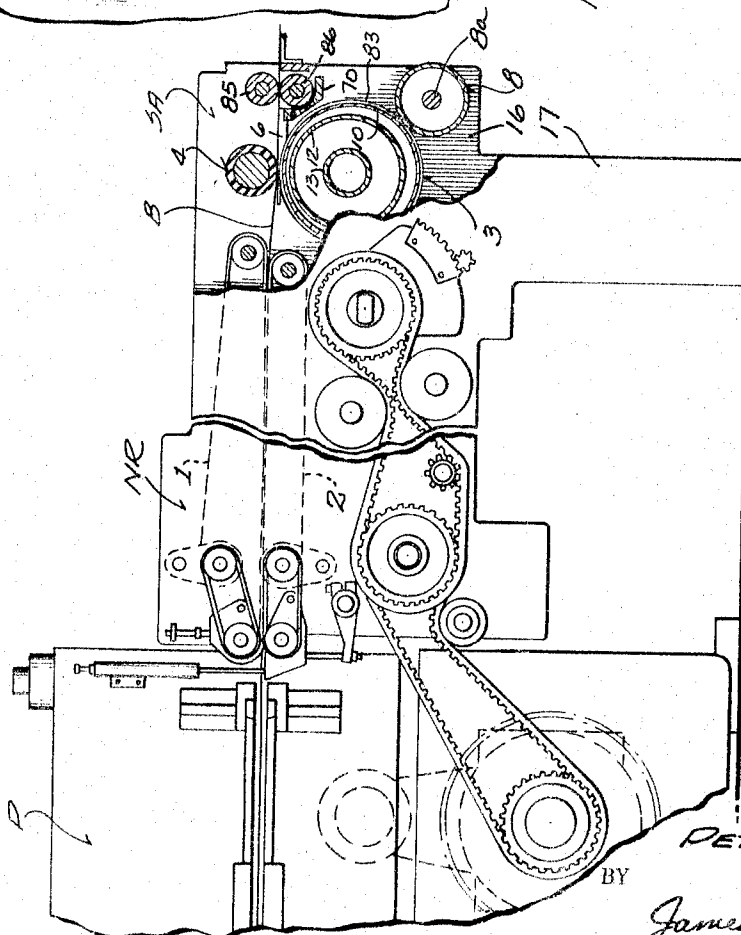
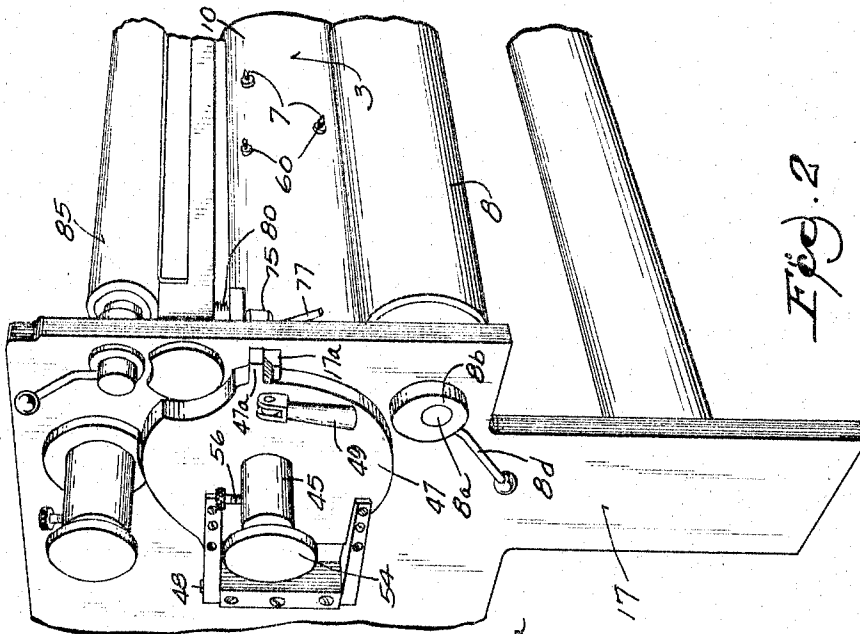
P. ZERNOV

3,320,864

SELF-COMBING PIN TYPE STRIPPER FOR BLANK FORMING APPARATUS

Filed Oct. 30, 1964

4 Sheets-Sheet 1



INVENTOR.
PETER ZERNOV

BY

James E. Niles
ATTORNEY

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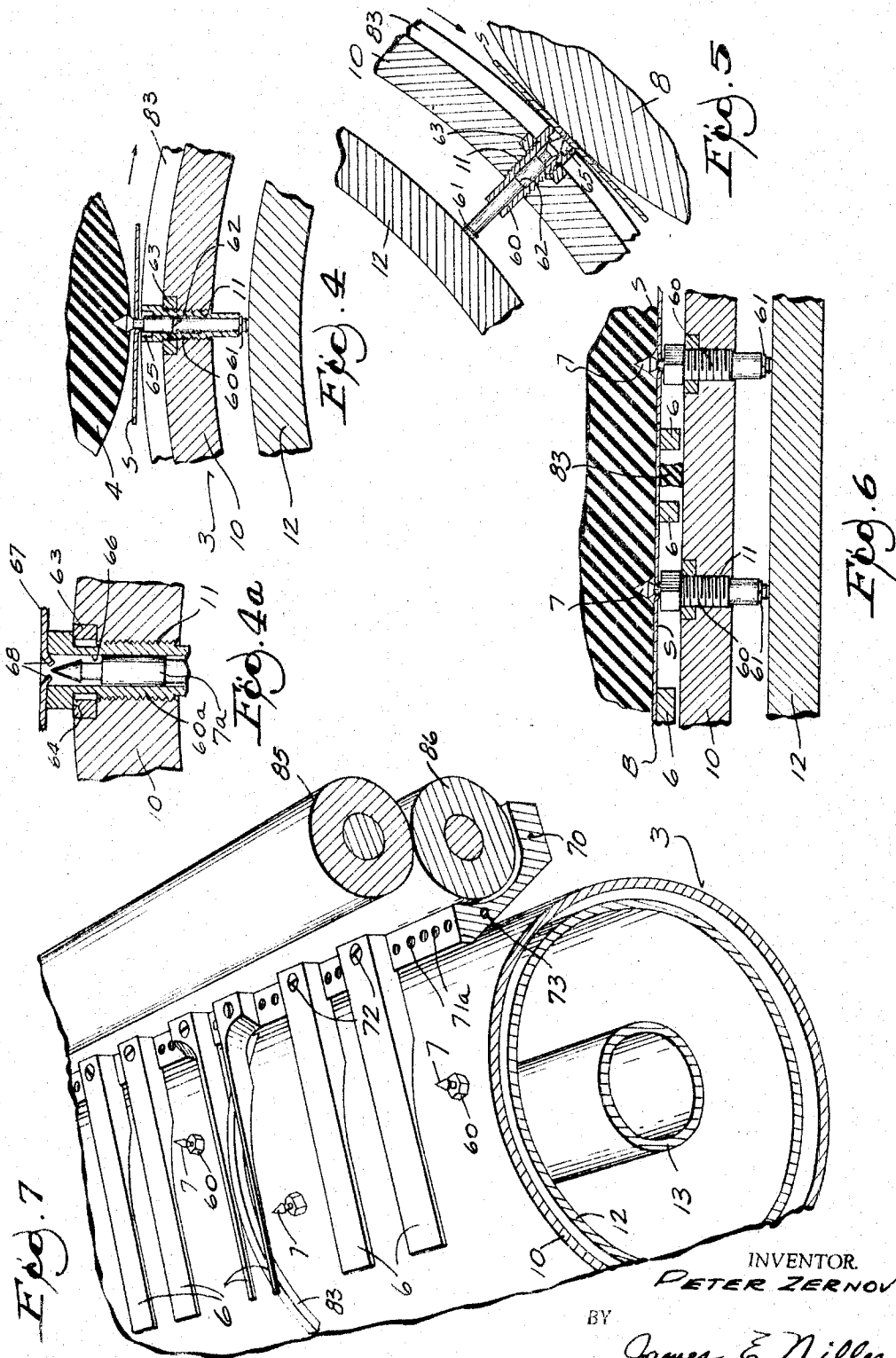
P. ZERNOV

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INVENTOR
PETER ZERNOV

BY

James E. Niles
ATTORNEY

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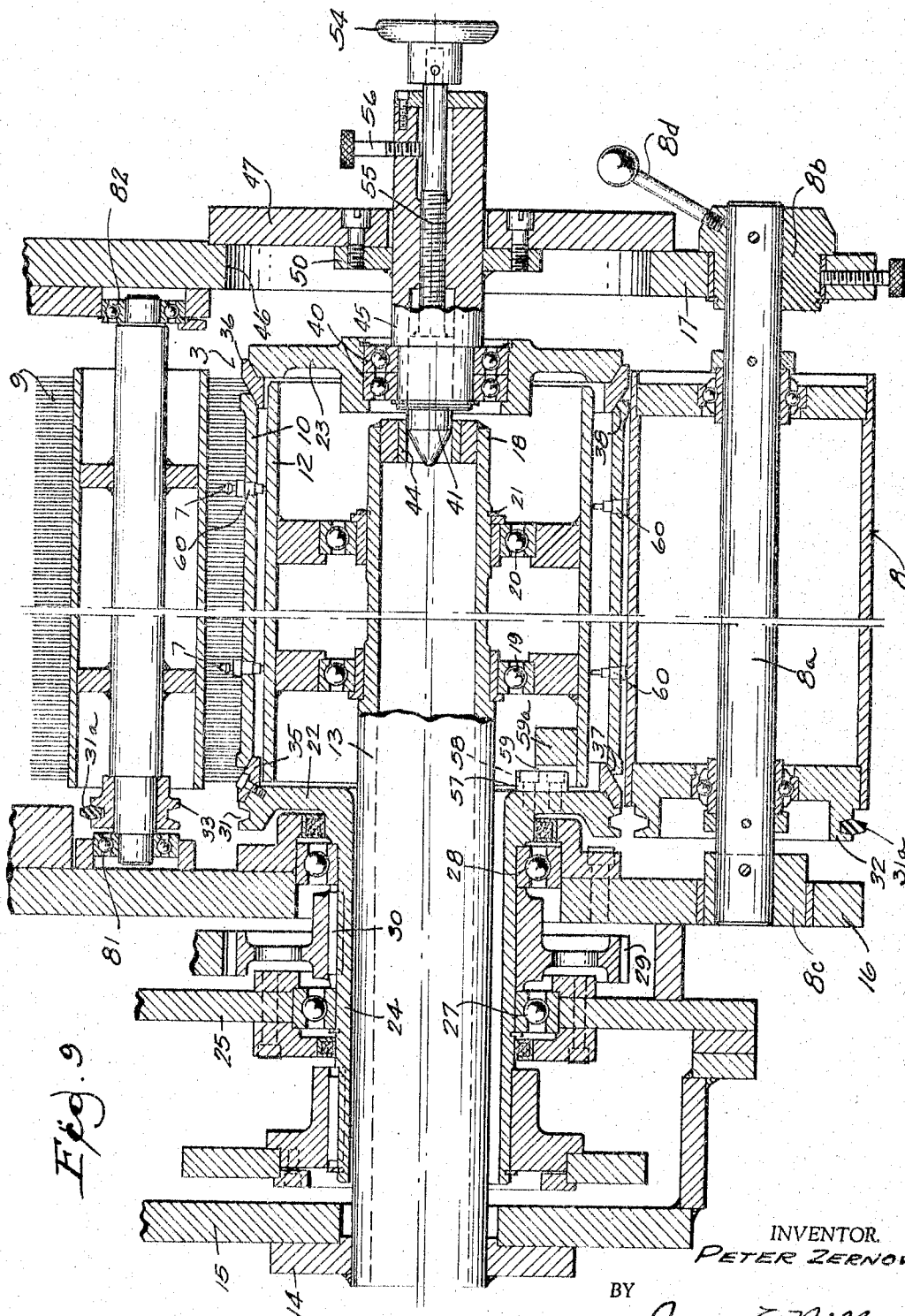


Fig. 9

INVENTOR.
PETER ZERNOV

BY

James E. Nilles
ATTORNEY

May 23, 1967

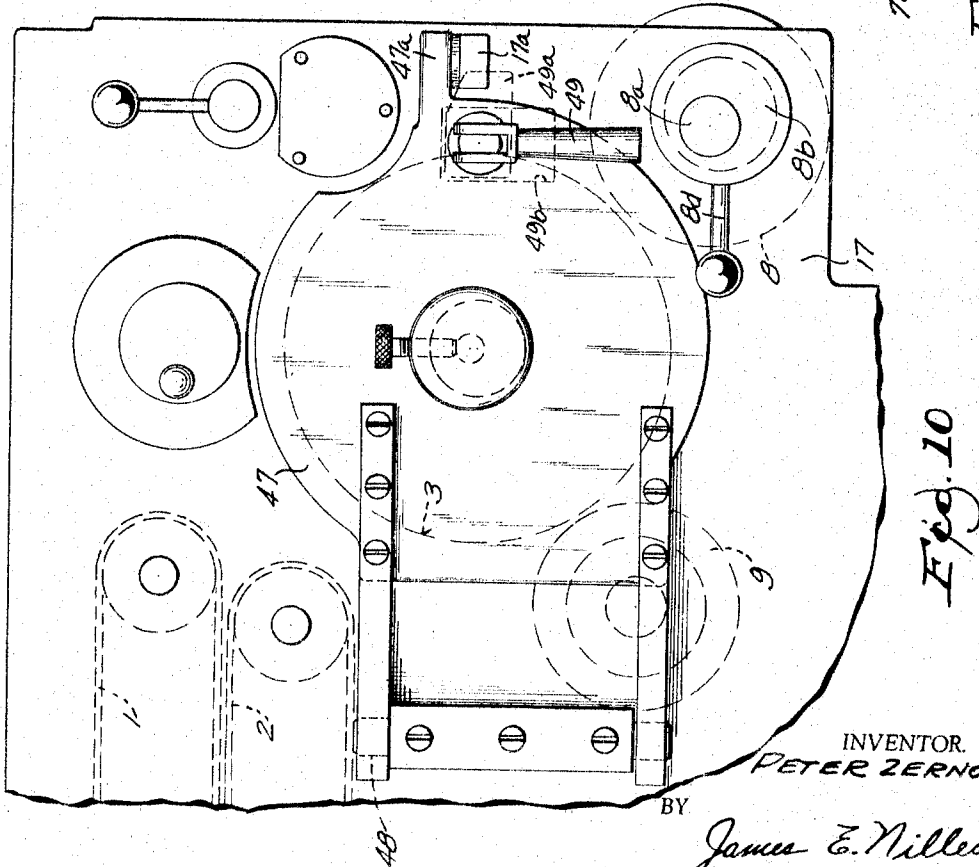
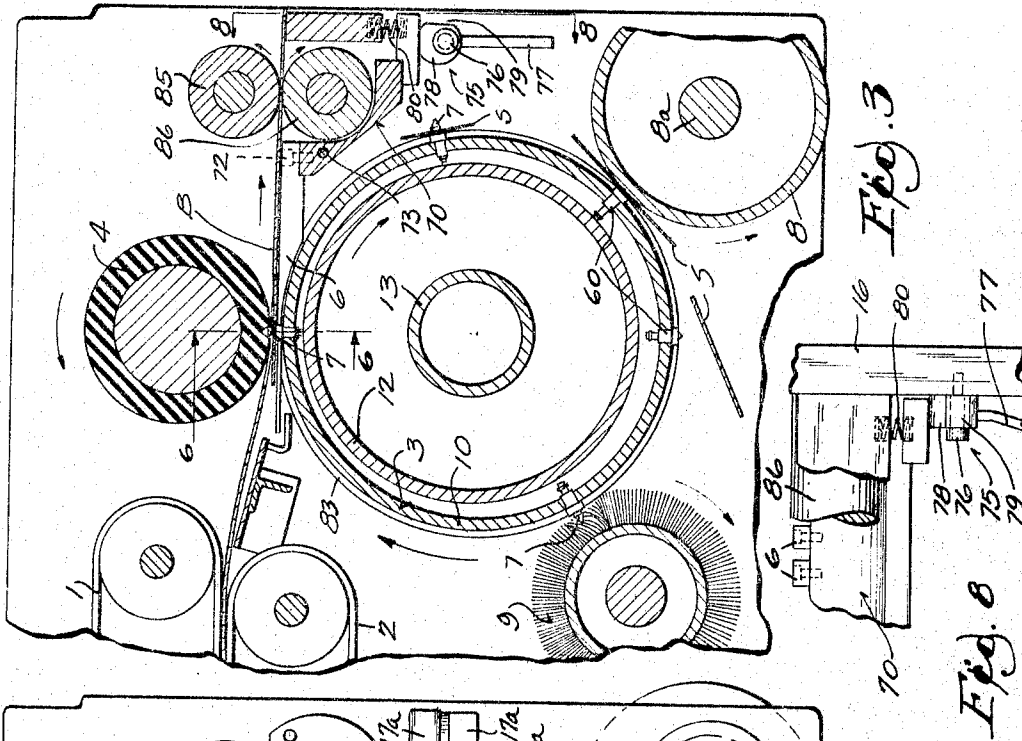
P. ZERNOV

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4 Sheets-Sheet 4



INVENTOR
PETER ZERNOV

BY

James E. Nilles
ATTORNEY

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SELF-COMBING PIN TYPE STRIPPER FOR BLANK FORMING APPARATUS

Peter Zernov, Milwaukee, Wis., assignor to Zerand Corporation, Menomonee Falls, Wis., a corporation of Wisconsin

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10 Claims. (Cl. 93—36)

The present invention relates generally to apparatus for forming carton blanks or the like, and more particularly relates to the stripper mechanism for stripping the waste or scrap portion from the cut and/or scored blank.

Pin type strippers have heretofore been proposed and used with some success, but they do have certain shortcomings. For example, some are limited as to complete freedom of choice of locating the pins in the cylinder because of the combing device which is necessary to pull the impaled scrap off the pins. In addition, the prior art pin combing devices were not always positive in removing the waste from the pins.

In accordance with the present invention, an improved pin-type stripper mechanism is provided for blank forming apparatus in which mechanism the pins can be located on a cylinder so as to accommodate any blank configuration, without regard to a pin combing device. With this mechanism, complete flexibility in locations of the pins is possible.

The invention further provides a pin stripper mechanism which is completely positive in removing the scrap material from the pins.

More specifically, the present invention provides a self-combing stripper having a rotatable and hollow cylinder with retractable pins which extend through the wall of the cylinder and withdraw into impaling position and hold them there as they rotate with the cylinder to be forced through the scrap; after further rotation and removal of the scrap from the rest of the blank, the pins are forcibly pushed within the cylinder to permit removal of the scrap therefrom.

Still another object is to provide a pin-type stripper of the above type and supporting bushing which insures that the waste material that is impaled on the pin is completely released and a part of it is not sheared off as the pin is subsequently projected outwardly.

Another aspect of the present invention relates to novel means for mounting the hollow stripper cylinder and removing it with an endwise movement from the main frame of the apparatus. In this manner the cylinder can be readily removed and replaced for different jobs with a minimum of lost time and expense.

Another aspect of the invention relates to the fingers or riders for the blanks and the means for mounting them.

These and other objects and advantages will appear later as this disclosure progresses, reference being had to the accompanying drawings, in which:

FIGURE 1 is a side elevational view of blank forming apparatus embodying the present invention, certain parts being broken away or in section for clarity;

FIGURE 2 is a perspective view of a portion of the apparatus shown in FIGURE 1, but on an enlarged scale;

FIGURE 3 is a sectional, elevational view, of a portion of the apparatus shown in FIGURES 1 and 2, but on an enlarged scale and with parts broken away or removed for clarity;

FIGURE 4 is an enlarged, fragmentary, sectional view showing some of the parts as shown in FIGURE 3;

FIGURE 4a is a view similar to FIGURE 4 but showing a modified form of bushing and pin;

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FIGURE 5 is an enlarged detail view of some of the parts as shown in FIGURE 3;

FIGURE 6 is a sectional view taken along line 6—6 in FIGURE 3, but on an enlarged scale;

FIGURE 7 is a fragmentary perspective view of the riders and taken generally from above the apparatus, some parts being shown in section or broken away;

FIGURE 8 is a fragmentary, detail view of the cam assembly for the fingers, the view being taken along line 8—8 in FIGURE 3;

FIGURE 9 is a "spread out," sectional view taken longitudinally through the stripper assembly, the ejector roll and the brush roll, certain parts being shown as broken away or removed for clarity in the drawings; and

FIGURE 10 is a fragmentary, elevational view of part of the apparatus as shown in FIGURE 2.

The general environment of stripper apparatus SA of the present invention is shown in FIGURE 1, and this apparatus is in the nature of an improvement over the apparatus shown in U.S. Patent No. 2,888,860 issued on June 2, 1959 and entitled, "Blank Forming Apparatus." Apparatus SA receives the blanks B and scrap S, which are formed in a cutter-creaser press P, from between the conveying belts 1 and 2 of the nip roll and conveyor mechanism NR. If a more complete description of the structure or function of this nip roll and conveyor mechanism is deemed to be either necessary or desirable, reference may be had to the co-pending application of Ser. No. 268,266, filed Mar. 23, 1963, now Patent No. 3,173,346 and entitled "Stripper Nip Roll Mechanism for Blank Forming Apparatus," which issued on Mar. 16, 1965, as Patent Number 3,173,346.

The general organization of the present apparatus includes the stripper drum assembly 3 and an upper anvil roll 4. The blanks and scrap travel in the direction indicated by the arrow and between the stripper drum and the anvil roll. They are guided in their movement between these rolls by the stiff riders 6 which extend therebetween. It is while passing between the stripper drum and the anvil roll that the scrap is impaled on the stripper pins 7. The scrap material then travels downwardly and the pins are pushed within the drum by means of the ejector cylinder 8. At this point, the scrap falls from the pins to the floor. A brush roll is positioned ahead of the ejector cylinder and contacts the drum to remove the "fuzz" from the drum assembly.

Referring now in greater detail to the drawings, a stripper drum assembly includes a hollow cylinder 10 having a plurality of openings 11 around its periphery and also in axially spaced relationship. Within the cylinder is mounted a back up cylinder 12. This cylinder is mounted eccentrically with respect to the outer cylinder 10, as clearly shown in FIGURE 3. The support for the stripper assembly is in the form of a dead shaft 13 which is supported by its end plate 14 (FIGURE 9) in the sidewall 15 of the main frame. The main frame also includes the sidewalls 16 and 17 which are fabricated from heavy plates of steel. In this manner, the shaft 13 is rigidly fixed and its inner end terminates as at 18 (FIGURE 9). The eccentric cylinder 12 is mounted on this shaft 13 by means of the anti-friction bearing assemblies 19 and 20, and the snap ring 21 holds the eccentric cylinder and its bearing assemblies in assembled relationship on the dead shaft 13.

The stripper cylinder 10 is replaceably mounted by means of end plates 22 and 23. End plate 22 has a long hub 24 by means of which it is journaled in the frame members 25 and 16 by the anti-friction bearing assemblies 27 and 28, respectively. A large gear member 29,

which is driven from a power source (not shown), is fixed to hub 24 by means of a key 30, and it is through this gear that rotational drive is furnished to the stripper assembly and also to the ejector roll 8 and brush roll 9. The end plate 22 has formed integrally therewith a sheave 31 and this sheave is connected by an endless belt 31a to an aligned sheave 32 on the ejector roll and a sheave 33 on the brush roll 9. Adapter rings 35 and 36 are fixed respectively to the end plates 22 and 23 and have inclined seating surfaces 37 and 38 respectively between which the stripping cylinder is adapted to be accurately seated and held captive. These adapter rings are for the purpose of being able to accommodate stripping cylinders of different sizes. In other words, if the adapter rings are not used, a larger cylinder may be employed which sets directly against the end walls 22 and 23.

The end plate 23 is journaled by bearing assemblies 40 mounted on sleeve 45 in which the pilot shaft 41 is slidable. The end plate 23 can be readily removed in an endwise direction and outwardly of the frame member 17 as follows. The inner end of the pilot shaft 41 is supported in a bushing 44 fixed in the inner end of the dead shaft 13. Thus, by removing the end plate 23 from outer cylinder 10, it can be axially removed through the end wall 17. This particular stripper cylinder 10 can then be replaced by another having pins of different location thereon for use with jobs having different blank configurations, that is, different scrap patterns.

The end wall 17 has a large opening 46 which is closed by the door 47. The door has a hinge shaft 48 (FIGURE 10) by means of which it is swingable from a closed position in which it is held by the latch 49. Latch 49 can be swung upwardly from the FIGURE 10 position, as indicated by the arrow in FIGURE 10, so that its locking lug 49a, which is located on the inside of wall 17, can pass through opening 49b in the wall. A locating projection 47a on the door rests on a pad 17a fixed to the wall 17, thereby accurately locating the door in the closed position.

Referring again to FIGURE 9, the sleeve 45 is rigidly fixed to the door 47 by the plate 50 to which it is welded and which is bolted to the door. The cylinder wall 23 acts as a chucking head for the stripping cylinder 10.

The stripping cylinder 10 is disassembled as follows. The pilot shaft 41 is first withdrawn from the dead shaft by means of the hand wheel 54 which is secured to the outer end of shaft 41, the shaft being threadably engaged as at 55 with an internal portion of the sleeve 45. The set screw 56 bears against shaft 41 and holds it in the desired position and when this screw is loosened the pilot shaft can be withdrawn by rotating the hand wheel 54 in an outward direction. After the shaft has thus been pulled axially from the dead shaft, the latch 49 is swung so that lug 49a can clear through opening 49b, permitting the door 47 to swing open, carrying with it the end wall 23 of the cylinder. The outer cylinder 10 can thus be removed axially for replacement or repair.

A drive connection is provided from the cylinder 10 to the inner eccentric cylinder 12 by means of a block 57 secured to wall 22 by screws 58, which block fits in a slot 59 that is formed in another block 59a secured to the inside of cylinder 12. The slot is somewhat larger than block 57 to accommodate the relative rotation between the cylinders due to the eccentricity therebetween.

Turning now to the stripper pins, they are slidably mounted in bushings 60 (FIGURES 4-6) which are threaded into the cylinder openings 11. These pins are held captive in the bushings by means of a snap ring 61 at their inner ends. A shoulder 62 on the pin prevents them from withdrawing too far within the cylinder 10 and thus becoming disassembled, as for example, when the outer cylinder 10 and its pins are withdrawn axially through the side of the machine as above described.

The cylinder 10 is formed from a relatively soft material such as magnesium and the externally threaded

steel bushing 60 is self-tapping and drawn tightly against the cylinder. In order to prevent a shoulder 63 of the bushing from cutting the outer surface of the cylinder when the bushing is tightened down on the cylinder, a hardened steel washer 64 is press fit into the cylinder around the opening 11 and shoulder 63 seats against it. The internal diameter of the washer is large enough to permit the bushing to slide through it.

In accordance with one aspect of the present invention, a certain amount of clearance has been found desirable between the head of the pin and the outer end of the bore in the bushing. This clearance may be provided as shown in FIGURES 4 and 5 by forming a counterbore 65 in the outer end of the bushing which is larger than the head of the pin. Alternatively, as shown in FIGURE 4a, the pin head may be made of a smaller diameter than the straight bore 66 of the bushing 60a. In either event clearance is provided between the pin head and the outer end of the bore in the bushing for the following purpose.

As shown in FIGURE 4a the pin 7a has a smaller diameter head than the largest part of the pin, and is withdrawn into the bore 66 after being pulled from the piece of scrap 67. The edges 68 of the scrap 67 formed by puncturing by the pin, have been pulled down into the bore slightly. If the pin head were the same diameter as the bore, when the pin was again pushed outwardly of the cylinder, it would often shear the edge 68 off the remainder of the scrap and thus form a loose ring of scrap. These rings would eventually collect and build up around the pin, not only causing malfunctioning of the pin but also requiring additional force to push the pin into the bushing and thereby reducing the life of the pin beyond tolerable limits.

I have eliminated this serious problem by providing the above described clearance between the pin head and the bore of the bushing which prevents the formation of these loose rings by the shearing action on the otherwise entrapped scrap between the pin and bushing on outward stroke of the pin.

The riders 6 would normally prevent the drum 10 and its fingers from being withdrawn axially, because the fingers are forced by eccentric cylinder 12 to extend in between the riders. To avoid this interference, the riders are mounted so they can swing upwardly and out of the way of the pins as follows. A transverse mounting bar 70 (FIGURES 1, 3, 7 and 8) extends across the rear end of the fingers and has a series of threaded apertures 71a which receive cap screws 72. These screws rigidly hold the fingers in any adjusted position along the bar so as to accommodate various scrap patterns. In other words, the fingers support the blank and scrap as they pass thereover and yet permit the pins to extend between the fingers and impale the scrap thereon. The bar 70 is pivoted about point 73 (FIGURES 3 and 7) so as to be able to swing the fingers upwardly as above mentioned. A cam assembly 75 (FIGURES 2, 3 and 8) pivoted at 76 holds the bar 70 in the operative position as shown in the drawings, or alternatively, can permit the bar 70 to swing downwardly thus rotating about pivot point 73 and swinging the riders upwardly. The bar can assume the latter position when the lever 77 fixed to the cam 78 is swung upwardly in a counterclockwise direction as viewed in FIGURE 3, at which time the innermost cam surface 79 is presented to bar 70. Spring 80 then causes bar 70 to pivot and the riders swing to the upward position.

The ejector roll is mounted on shaft 8a in the side walls 16 and 17 on eccentrics 8b and 8c. A lever 8d is used to throw the eccentric roll out of contact with the stripping cylinder 10 when it is desired to remove the cylinder as above mentioned.

The brush roll is mounted in antifriction bearings 81 and 82 in a conventional manner in the side walls of the machine.

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As the blank and scrap pass between the upper rubber roll and the stripper assembly, the pins impale the scrap material. A series of rubber rings 83 extend around the outer surface of the stripper cylinder 10 and act to cushion the blank B and scrap material S and permit the pins to completely penetrate the scrap. In other words, the rubber rings hold the blank and scrap a sufficient distance from the cylinder 10 to insure that the scrap is completely impaled over the head of the pin and the rubber roll itself also insures that this occurs. Nip rolls 85, 86 pull the blank from the stripper assembly.

The ejector cylinder forcibly drives the pins back within the periphery of the cylinder 10 to thereby insure that the scrap is free to fall by gravity away from the cylinder 10 after leaving the ejector cylinder.

With the present arrangement, the pins are positively controlled at all times, and they may be located any place on the cylinder 10 because there is no external comb for the pins to be aligned with to accomplish the necessary stripping action.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

What is claimed is:

1. In blank forming apparatus the combination with feeding means for advancing a blank having a scrap portion thereon, a rotatable cylinder, stripper pins reciprocally mounted on said cylinder for sliding between positions in which they are extended and withdrawn in respect to the periphery of said cylinder, rotatable means located adjacent said cylinder for cooperation therewith as said blank passes therebetween, said rotatable means being engaged by said pins when extended to facilitate impaling said scrap portion thereon, means within said cylinder to cause said pins to extend outwardly during a portion of the rotation of said cylinder, and means to cause said pins to retract and thereby withdraw from said impaled scrap portion.

2. In blank forming apparatus the combination with feeding means for advancing a blank having a scrap portion thereon, a rotatable hollow cylinder having a plurality of openings therein, stripper pins reciprocally mounted in said openings for sliding between a position in which they partially extend outwardly of the periphery of said cylinder so as to impale said scrap portion thereon, and a position in which they are substantially withdrawn within said periphery so as to be withdrawn from said scrap portion, rotatable means located adjacent said hollow cylinder for cooperation with said pins when extended to facilitate impaling said scrap portion thereon, means within said cylinder to cause said pins to extend outwardly during a portion of the rotation of said cylinder, and means to cause said pins to retract and thereby withdraw from said impaled scrap portion.

3. In blank forming apparatus the combination with feeding means for advancing a blank having a scrap portion thereon, a rotatable hollow cylinder having a plurality of openings therein, stripper pins reciprocally mounted in said openings for sliding between a position in which they partially extend outwardly of the periphery of said cylinder so as to impale said scrap portion thereon, and a position in which they are substantially withdrawn within said said periphery so as to be withdrawn from said scrap portion, a rotatable anvil roll located adjacent said hollow cylinder and between which said blank passes, said roll being engaged by said pins when extended to facilitate impaling said scrap portion thereon, an eccentrically located drum within said cylinder and against which the inner ends of said pins abut to cause said pins to extend outwardly during a portion of the rotation of said cylinder, and means to cause said pins to retract and thereby withdrawn from said impaled scrap portion.

4. In blank forming apparatus, a main frame including

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a pair of sidewalls, a stripper cylinder rotatably mounted in said frame and having retractable stripper pins extending therefrom for impaling and stripping a scrap portion from a blank, riders extending across said cylinder for supporting said blank and scrap portion as they move over said cylinder, said pins extending upwardly between said riders so as to impale said scrap portion, said cylinder being removable in an endwise direction from said frame, and means mounting said riders in said frame for shifting away from said cylinder and clear of said pins to thereby permit endwise removal of said cylinder and said pins.

5. In blank forming apparatus, a main frame including a pair of sidewalls, a stripper cylinder rotatably mounted in said frame and having retractable stripper pins extending therefrom for impaling and stripping a scrap portion from a blank, a bar extending generally parallel and adjacent to said cylinder, and riders secured to said bar and extending across said cylinder for supporting said blank and scrap portion as they move over said cylinder, said pins extending upwardly between said riders so as to impale said scrap portion, said cylinder being mounted for removal in an endwise direction from said frame, said bar being swingably mounted in said frame for swinging said riders away from said cylinder and pins to thereby permit endwise removal of said cylinder and pins.

6. In blank forming apparatus, a main frame including a pair of sidewalls, one of said sidewalls having an opening therethrough, a door swingably mounted on said sidewall to cover said opening, said door and the other sidewall each having a stud shaft mounted thereon and extending inwardly in co-axial alignment, and a stripper cylinder rotatably mounted on said shafts, said door and its stud shaft being swingable away from said cylinder to permit said cylinder to be removed in an endwise direction and through said opening in said sidewall.

7. In blank forming apparatus, a main frame including a pair of sidewalls, one of said sidewalls having an opening therethrough, a door swingably mounted on said sidewall to cover said opening, said door and the other sidewall both having a stud shaft mounted thereon and extending inwardly therefrom in co-axial alignment, a stripper cylinder rotatably mounted on said shafts, and means on said door and connected to said shaft on said door for shifting said shaft axially and in respect to said door to thereby withdraw said shaft from the cylinder, said door and its stud shaft then being swingable away from said cylinder to permit said cylinder to be removed in an endwise direction and through said opening to said sidewall.

8. In blank forming apparatus, a main frame including a pair of sidewalls, one of said sidewalls having an opening therethrough, a door swingably mounted on said sidewall to cover said opening, said door and the other sidewall both having a stud shaft mounted thereon and extending inwardly therefrom in co-axial alignment, a stripper cylinder rotatably mounted on said shafts, said door and its stud shaft being swingable away from said cylinder to permit said cylinder to be removed in an endwise direction and through said opening in said sidewall, said cylinder having retractable stripper pins extending therefrom for impaling and stripping a scrap portion from a blank, riders extending across said cylinder for supporting said blank and scrap portion as they move over said cylinder, said pins extending upwardly between said riders so as to impale said scrap portion, and means mounting said riders in said frame for shifting away from said cylinder and clear of said pins to thereby permit endwise removal of said cylinder and said pins.

9. Retractable pin type stripper means for blank forming apparatus, said means comprising, a rotatable hollow cylinder having a plurality of openings therein, stripper pins having an impaling head and reciprocally mounted in said openings for sliding between a position in which said head partially extends outwardly of the cylinder to impale a portion of scrap thereon, and a retracted posi-

ion in said cylinder so as to be withdrawn from said scrap, said head being of a smaller diameter than the diameter of a radially outward portion of said opening to hereby provide clearance between said head and the outer portion of said opening and prevent shearing action of said scrap located therebetween. 5

10. Means as defined in claim 9 wherein said outer portion of said opening is formed as a counterbore.

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BERNARD STICKNEY, *Primary Examiner.*