May 19, 1942. J. A. JOHNSON 2,283,504

MEANS FOR SEVERING DISKS FROM A WEB

Filed Nov. 16, 1939 4 Sheets-Sheet 1

Fig.-2

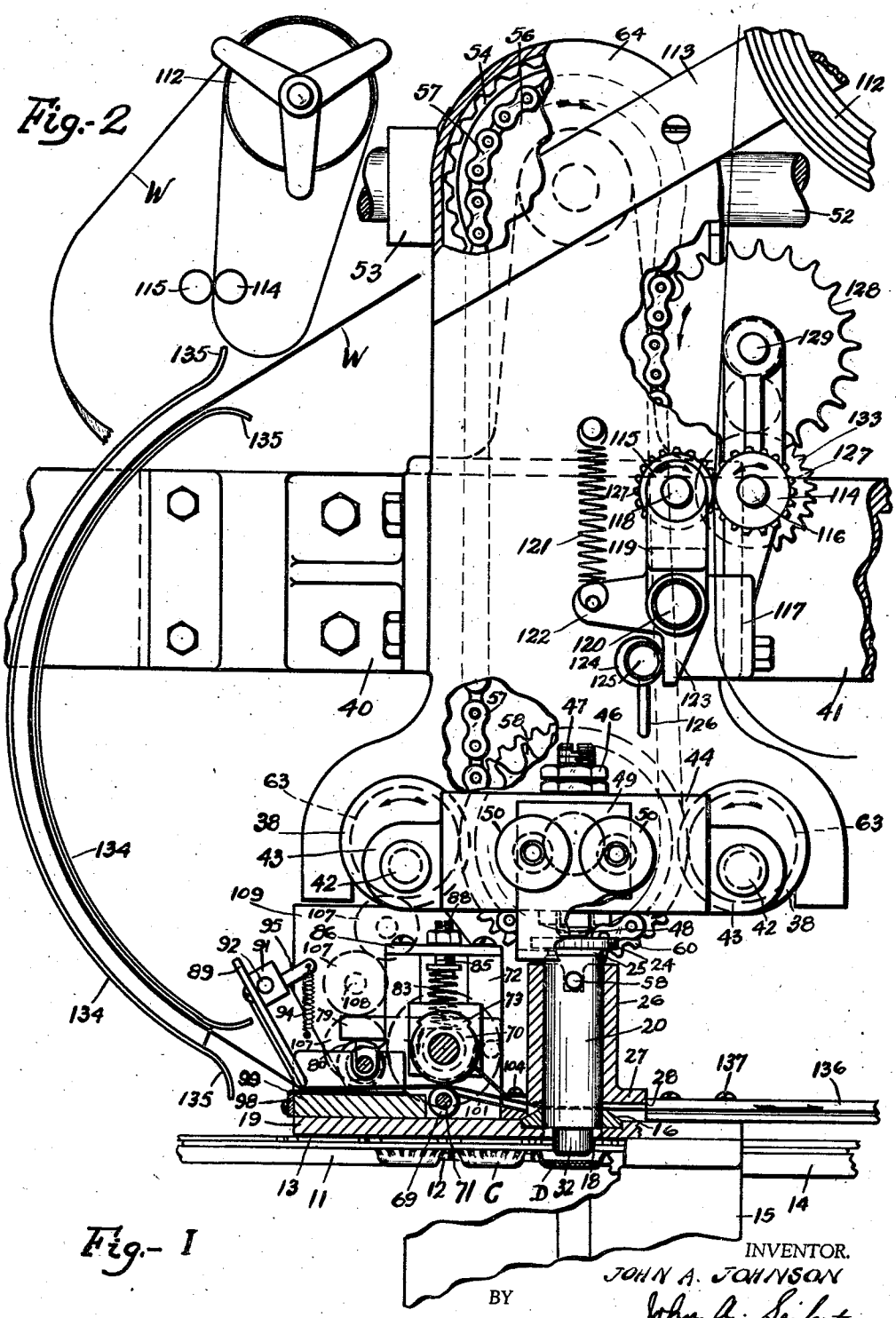


Fig.- I

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MEANS FOR SEVERING DISKS FROM A WEB

Filed Nov. 16, 1939 4 Sheets-Sheet 2

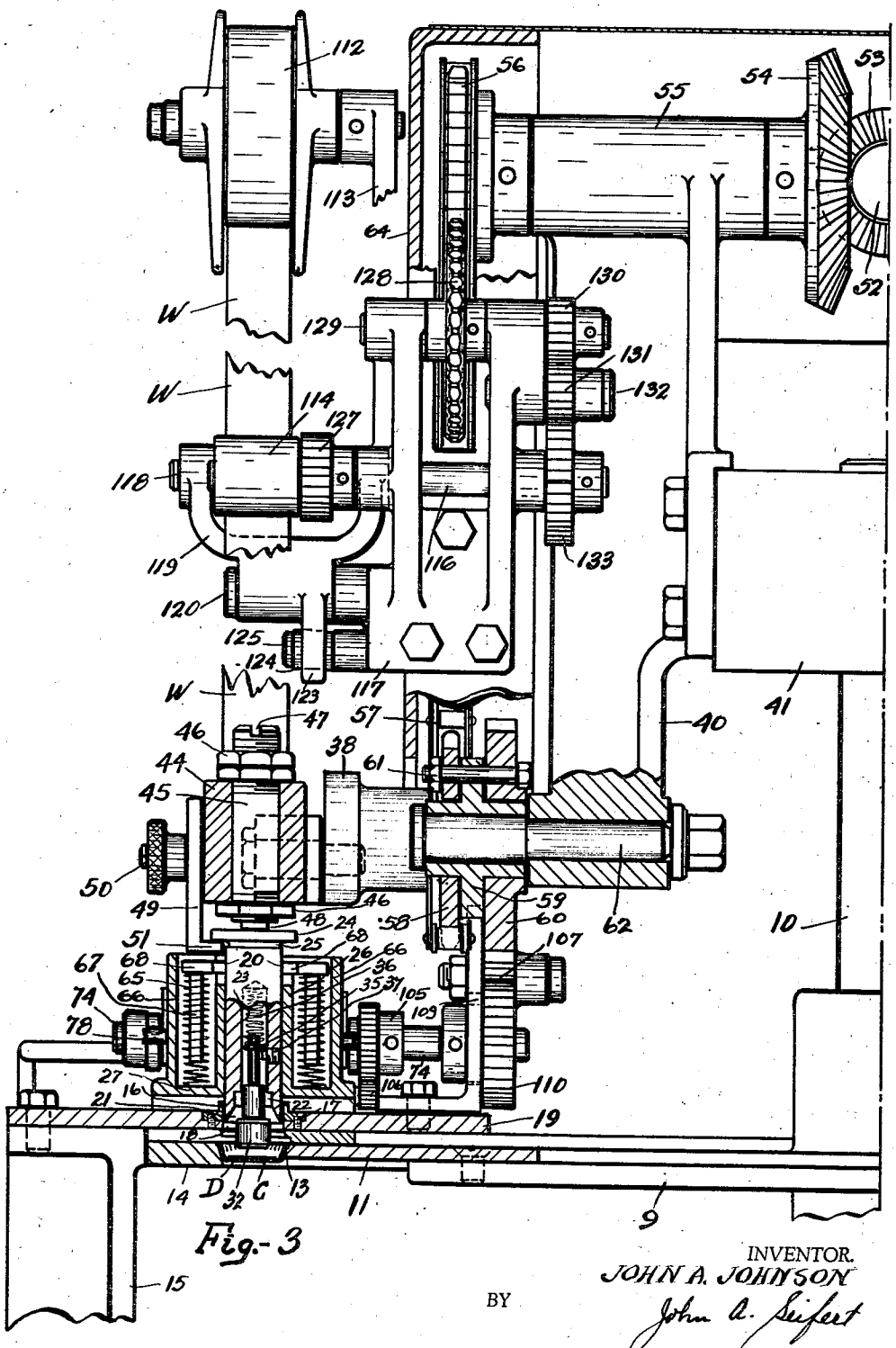


Fig.-3

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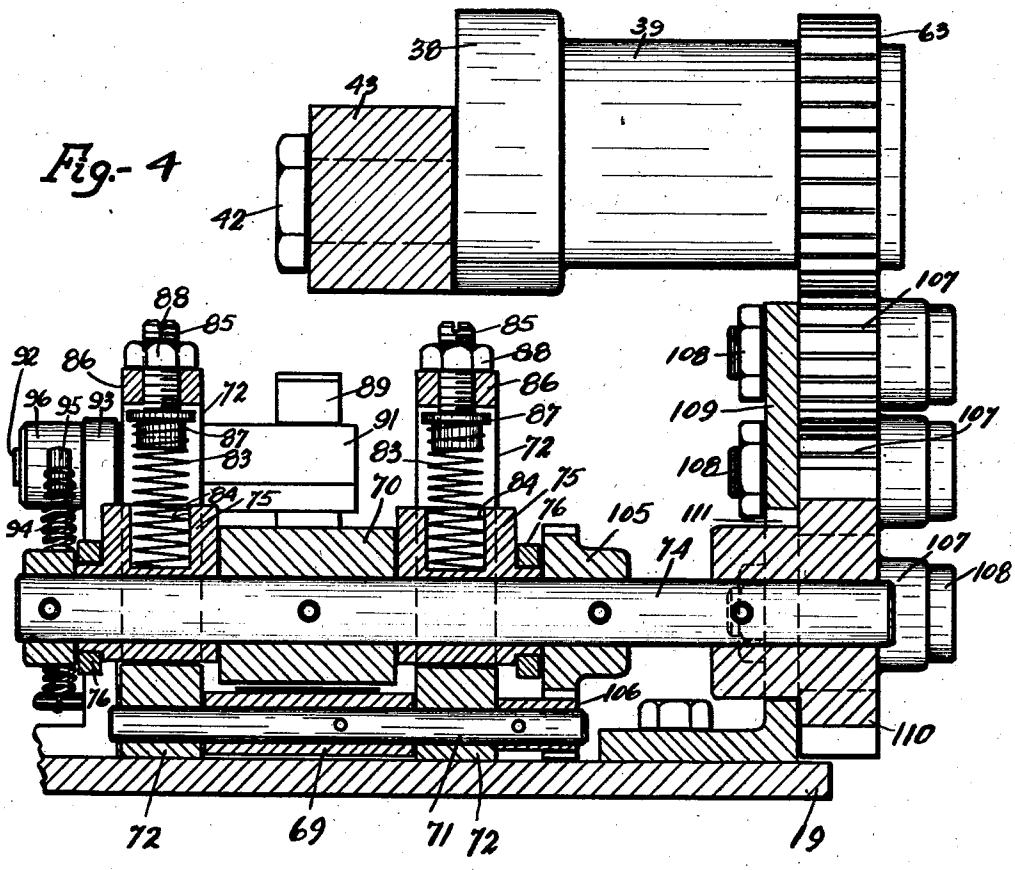
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May 19, 1942. J. A. JOHNSON 2,283,504

MEANS FOR SEVERING DISKS FROM A WEB

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Fig.- 4



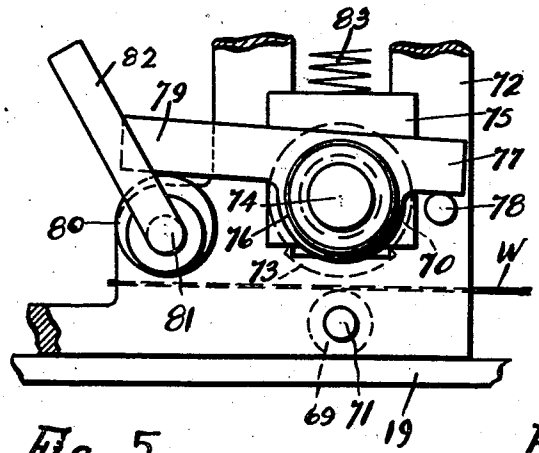


Fig.- 5

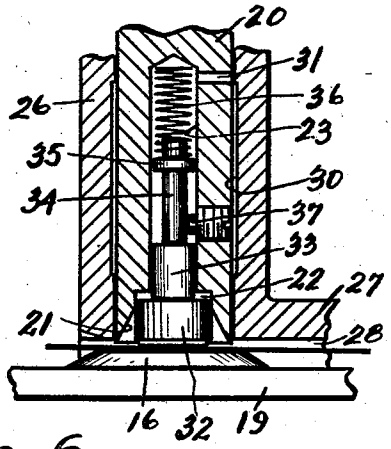


Fig.- 6

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MEANS FOR SEVERING DISKS FROM A WEB

Filed Nov. 16, 1939 4 Sheets-Sheet 4

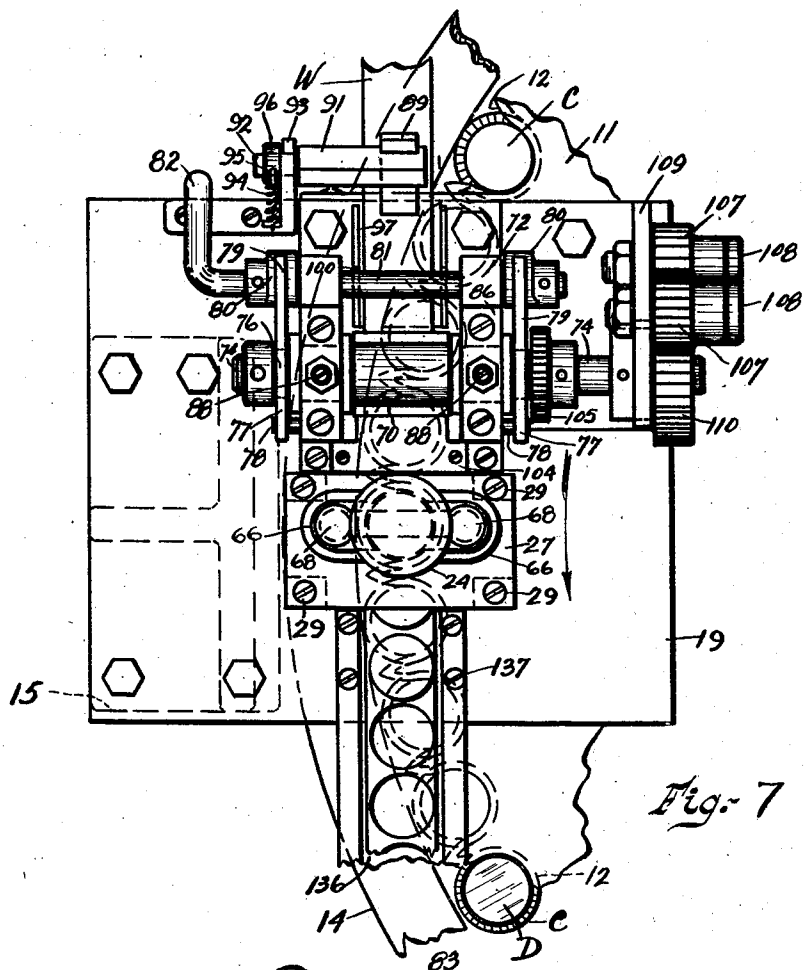


Fig. 7

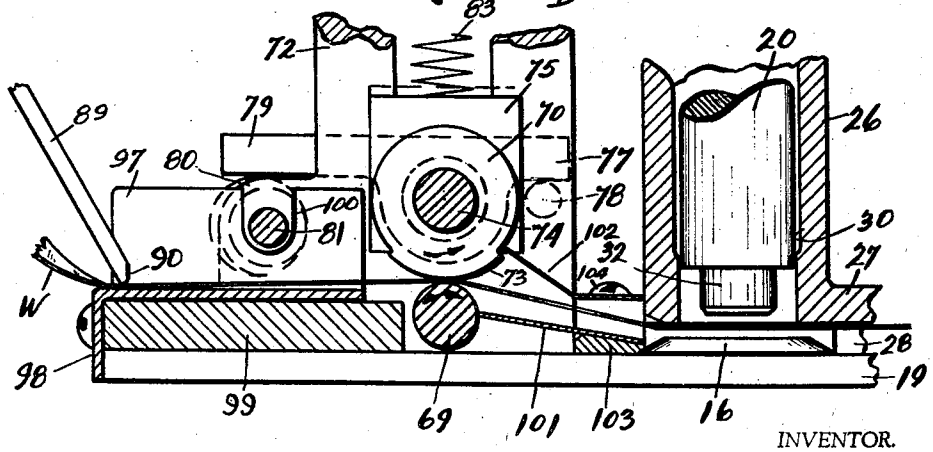


Fig. 8

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2,283,504

UNITED STATES PATENT OFFICE

2,283,504

MEANS FOR SEVERING DISKS FROM WEBS

John A. Johnson, Woodhaven, N. Y.

Application November 16, 1939, Serial No. 304,745

6 Claims. (Cl. 164—89)

This invention relates to means for severing disks from a web and particularly adapted for severing disks from a web impregnated or coated with an adhesive and depositing said disks in receptacle closure caps to provide said receptacle closure caps with an adhesive for uniting a sealing pad to be deposited in the receptacle closure caps to said receptacle closure caps.

It is an object of this invention to provide a novel arrangement of parts to intermittently feed predetermined lengths of the web to punch and die mechanism without imparting sudden and uneven strains to the web and resulting in frequent breaking of the web and interruptions in the severing and depositing of disks into receptacle closure caps.

It is another object of the invention to provide a novel arrangement of punch and die mechanism embodying means for stripping the severed disks from the punch and die without being actuated by external means which is the usual practice employed in the present commerical type of punch and die mechanisms.

It is a further object of the invention to provide novel means for actuating the punch into and out of the die whereby it is possible to provide common means for connecting a drive shaft to the web feeding means and the punch actuating means.

Further objects and advantages of the present invention will be more clearly set forth in the detail description of the embodiment of the invention.

In the drawings accompanying and forming a part of this application, Figure 1 is an elevational view of means for severing disks from a web embodying web feeding means and punch and die mechanism mounted relative to a conveyor for receptacle closure caps, with a portion of the web feed broken away and the die in section to show the punch in position subsequently to severing and positioning a disk in a closure cap.

Figure 2 is a fragmentary and diagrammatic view of the portion of the web feed broken away in Figure 1.

Figure 3 is an elevational view looking toward the right hand side of Figure 1 with the punch and die in section.

Figure 4 is an enlarged view in section of a pair of rollers for intermittently feeding the web to the punch and die mechanism.

Figure 5 is a side view of the pair of rollers shown in Figure 4 looking at the left hand side of said figure and showing the upper roller positioned from the lower roller.

Figure 6 is a fragmentary sectional view of the cutting end of the punch and showing a stripping plunger positioned within the punch by the web prior to the severing of a disk from the web.

Figure 7 is a plan view of the web feeding rollers of Figure 4 and the punch and die mechanism.

Figure 8 is a fragmentary view of the web feeding rollers shown in Figures 4 and 5 with the upper roller in position to feed a predetermined length of web, and of the punch and die with the punch in uppermost position and the stripping plunger projecting from the punch and out of contact with the web.

In carrying out the embodiment of the invention illustrated in the accompanying drawings, the means to sever adhesive disks from a web is shown in connection with apparatus for assembling sealing pads in receptacle closure caps C of the crown type wherein the closure caps are transported relative to the disk severing means and sealing pad assembling means, not shown, by a table 9 rotatably mounted on a vertical post 10 and having an annular plate 11 fixed to the periphery thereof and arranged with equidistantly spaced recesses 12 in the outer periphery for supporting the receptacle closure caps C. The closure caps are retained in the recesses 12 by another plate arranged with recesses corresponding to the recesses 12 and having the lower portion undercut, as shown at 13 in Figure 3, and an annular member 14 fixed to the supporting frame 15 of the apparatus and encircling the recesses 12.

The means to sever disks D from a web W impregnated or coated on both faces with a suitable adhesive, comprises an annular die 16 having ears extending laterally from opposite peripheral portions and secured by screws, as shown at 17 in Figure 3, in a circular recess in the upper end of an opening 18 in a rectangular plate 19 fixed to and supported by the apparatus frame 15. The diameter of the opening 18 is the same as the diameter of the opening in the die 16, so that the opening 18 constitutes a part of the die. The punch cooperating with the die 16 comprises a rod shaped body 20 having one end arranged with an annular cutting edge by a circular recess having a beveled portion tapering inwardly of said edge, as at 21, to a uniform circular portion 22 communicating with an elongated portion 23 of less diameter than the portion 22 and terminating within the punch body, as shown in Figures 3 and 6. The end of the punch body opposite the cutting edge is arranged with a flat head 24 of greater diameter than the body and a por-

tion of less diameter than the body and head connecting the head with the body to form an annular groove 25. The outer diameter of the punch body is slightly less than the diameter of the opening in the die to permit the punch to pass into the die and sever a portion of the web W positioned over the die. The punch is slidably mounted in vertical alinement with and above the die by a tubular portion 26 of less length than the punch and integral at the lower end with and projecting from the upper face of a plate 27 having a transverse passage for the web in the under face, as shown at 28, and mounted upon the plate 19 by leg portions on the under face of the plate 27 abutting the upper face of the plate 19 and secured to said plate 19 by screws, as shown at 29 in Figure 7. The bore of the tubular portion 26 extends to the transverse passage 28 and an intermediate portion of said bore is arranged with elongated annular recess 30, as shown in Figures 6 and 8, to communicate with a transverse air port 31 in the punch 20 communicating with the elongated recess portion 23 thereof for a purpose to be hereinafter described. The opening 18 in the plate 19 is in vertical alinement with the path of travel of the cap supporting recesses 12, so that a disk D severed from the web W by the movement of the cutting edge of the punch 20 into the die opening will drop into a closure cap positioned below the opening 18 by a recess 12.

To assure the positioning of the severed disks D in the closure pads successively positioned below the opening 18 and die 16, the punch is provided with a stripping plunger comprising a head portion 32 slidable in the punch recess portion 22 and having a reduced portion 33 slidable in the elongated recess portion 23 of the punch and arranged with a stem portion 34 projecting into the recess portion 23 and having a laterally extending shoulder 35 adjacent the free end, as shown in Figure 6. The plunger head 32 is normally positioned to extend beyond the cutting edge of the punch 20 by a coiled spring 36 engaged on the free end of the plunger stem portion 34 with one end abutting the shoulder 35 and the opposite end abutting the closed end of the elongated recess 23 of the punch 20, and the outward movement of the head 32 being limited by the shoulder 35 engaging an abutment portion 37 projecting from the inner end of a plug screw threaded in the wall of the recess 23, as shown in Figure 3. The spring 36 is of such strength as to permit the plunger head 32 to be moved into the recessed portions 21 and 22 of the punch 20 by the portion of the web extending over the die 16 when the punch approaches the die, said movement of the head compressing the spring, as shown in Figure 6, and the severing of said web portion by the punch entering the die will permit the spring 36 to forcibly move the plunger head 32 from the recessed portions 21, 22 and move the severed disk D through the opening 18 into the closure cap C positioned below said opening, as shown in Figures 1 and 3. The moving of the plunger head 32 into the punch recessed portions 21, 22 by the web is facilitated by the air in the punch recessed portion 23 escaping through the port 31 and into the annular recess 30 in the bore of the tubular portion 26.

The punch 20 is continuously reciprocated into and out of the die 16 by actuating means particularly adapted to be readily incorporated in existing apparatus for assembling sealing pads in receptacle closure caps, and comprising a pair of disks or wheels 38 fixed on shafts rotatably mounted in bosses 39 in lateral extensions of a bracket 40 mounted on a beam 41 of the apparatus supporting the upper end of the post 10, as shown in Figures 1 and 3. Each of the wheels 38 has a headed stud 42 fixed therein eccentrically of the axis thereof to extend laterally of the face of the wheels and be engaged in openings in ears 43 projecting from the opposite ends of a block 44 having a vertical opening midway of said ears for the adjustable mounting of a tappet pin 45 having screw threads on the opposite end portions projecting from the top and bottom of the block for the engagement of locking nuts 46. The upper end of the tappet pin 45 is arranged with a screw driver slot 47 to facilitate adjustment of said pin and the opposite end is reduced to form a striking face 48 adapted to engage against the flat head 24 of the punch 20. The flat head 24 is retained in engagement with the striking face 48 by a plate 49 releasably carried by the block 44 by pins fixed in the outer face of the block and extended through alined openings in the plate 49 with knurled nuts screw threaded on the ends of the pins projecting from the plate, as shown at 50. The lower end of the plate 49 is flanged inwardly to engage under the flat head 24, as shown at 51, so that the tappet pin face 48 will be retained in engagement with the head 24 and the punch 20 will be reciprocated through the movement of the block in a circular path imparted thereto by the rotation of the wheels 38. The wheels 38 are continuously rotated from a drive shaft 52 of the apparatus through a beveled gear 53 fixed on the drive shaft and meshing with a beveled gear 54 fixed on one end of a stud shaft rotatably mounted in a bushing integral with the upper end of the bracket 40, as shown at 55. A sprocket wheel 56 is fixed on the opposite end of the stud shaft carrying the beveled gear 54 and engaged by an endless sprocket chain 57 engaging a sprocket wheel 58 mounted on one end of a sleeve having an annular flange intermediate the ends of the sleeve, as shown at 59, and supporting a gear 60 on the opposite end with the sprocket wheel 58 and gear 60 fixed to the sleeve by a bolt passed through alined openings in the sprocket wheel, the flange of the sleeve and the gear and secured in said openings by the head thereof and a nut screw threaded on the opposite projecting end, as shown at 61 in Figure 3. The sleeve is rotatably mounted on a stud shaft supported in a boss in the lower center portion of the bracket 40, as shown at 62. The gear 60 meshes with pinions 63 fixed on the shafts of the wheels 38 and imparts the rotation of the drive shaft 52 to the wheels 38. To prevent injury to the operator of the apparatus and the accumulation of dirt, the driving connection between the drive shaft 52 and the wheels 38 is covered by a shield 64 supported by the bracket 40.

To further assure the engagement between the punch head 24 and the tappet pin face 48 and the reciprocation of the punch 20 by the rotation of the wheels 38, the head 24 is yieldingly urged toward the tappet face 48 by a pair of coiled springs 65 confined within vertical compartments arranged on diametrically opposite sides of tubular portion 26, as shown at 66 in Figures 3 and 7, with the springs engaged on pins 67 fixed in and depending from arms projecting from diametrically opposite sides of the punch 20 adjacent the groove 25 and slidable in recesses in diametrical-

ly opposite sections of the upper end of the tubular portion 26, as shown at 68.

A predetermined length of the web W is fed intermittently to the punch and die through the passage 28 during the upward movement of the punch 20 by a pair of feeding rollers 69 and 70, roller 69 being of less diameter than the roller 69 and fixedly mounted on a shaft 71 rotatable at the opposite end portions in the solid wall portion of spaced bifurcated brackets 72 fixed on the plate 19. The roller 70 is arranged with a raised portion 73 on the periphery thereof and of a length equal to the length of the web to be fed to the punch and die, which length of the web being slightly greater than the diameter of the disks D to provide a portion of the web for marginally supporting the same in the passage 28 and over the die 16. The roller 70 is fixed on a shaft 74 of greater length than the shaft 71 rotatably mounted in bearing blocks 75 slidable in the bifurcations of the brackets 72 and adjustably supported to position the roller 70 with the periphery in spaced relation with the periphery of the roller 69 and the raised portion 73 adapted to cooperate with the roller 69 and feed a predetermined length of web to the punch and die. This is accomplished by a pair of plate members having an intermediate wide portion arranged with an opening to rotatably mount the plates on tubular extensions of the bearing blocks, as shown at 76, and one end portion 77 of each plate engaging a pin 78 fixed in and projecting laterally from the outer sides of a bifurcation leg portion of each bracket 72 with the opposite end portions 79 of the plates of greater length than the end portions 77. The end portions 79 are supported by cam disks 80 fixed on a shaft 81 rotatable in bearing extensions of the brackets 72 with one end of the shaft bent laterally to form a hand grip 82 to facilitate the actuation of the cam disks. The cam disks 80 are fixed on the shaft 81, so that a portion intermediate the low and high portions of the cam will position the end portions 79 in horizontal alinement with the leg portions 77 when the hand grip 82 is in a horizontal position, and the lifting of the hand grip from said horizontal position will adjust the end portions 79 out of horizontal alinement with the end portions 77 and lift the roller 70 to position the raised peripheral portion 73 in spaced relation to the roller 69, as shown in Figure 5. The roller 70 is yieldingly urged to position the raised portion 73 relative to the rollers 69 to cooperate therewith and feed a predetermined length of web to the punch and die by springs 83 seated at one end in recesses 84 in the upper center portion of the bearing blocks 75 and the opposite ends of the springs coiled about a reduced portion of a head of screws 85 adjustably mounted in the center of plates 86 spanning the bifurcations of the brackets 72 and fixed at the opposite ends to the bifurcation legs, as shown in Figure 1. The heads of the screws 85 are arranged with a shoulder to abut the upper ends of and compress the springs 83 into the recesses, as shown at 87 in Figure 4, and the free ends of the screws 85 extending above the spanning plates 86 are slotted for the engagement of a screw driver and the screws are retained in adjusted position by locking nuts, as shown at 88. The lifting of the hand grip 82 will lift the roller 70 against the force of the springs 83 and prevent the feeding of a predetermined length of web to the punch and die and also permit the threading of the web between the rollers 69, 70.

The web feeding rollers 69 and 70 are positively driven one from the other by a gear 105 fixed on an intermediate portion of the shaft 74 extending from the block 75 in the inner bracket 72 and meshing with a gear 106 fixed on the end of the shaft 71 extending from said inner bracket 72. The shaft 74 is continuously rotated from the drive shaft 52 through the beveled gears 53, 54, sprocket chain 57 and sprocket wheels 56, 58, gear 60, and the pinion 63 fixed on the shaft of the left hand wheel 38, looking at Figure 1. Said pinion 63 meshes with the uppermost gear of a train of gears 107 rotatably mounted on stud shafts 108 fixedly supported in the vertical portion of an angular bracket having the horizontal portion fixed to the plate 19, as shown at 109, and the lowermost gear of the train of gears 107 meshing with a gear 110 rotatably supported in an enlarged opening in the vertical portion of the bracket 109, as shown at 111 in Figure 4, and fixed to the end portion of the shaft 74 extending from the gear 105.

To prevent buckling of the portion of the web W being fed to the punch and die by the rollers 69, 70 and assure the feeding of uniform predetermined lengths of web by said rollers, a portion of the web before entering the bite of the rollers is maintained in taut condition by a finger 89 having the lower end beveled to grip the upper surface of the web, as shown at 90 in Figure 8, and the upper end portion of the finger is secured to a block 91 having an axial pintle 92 at one end rotatable in the vertical arm of an angular bracket 93 having the horizontal arm fixed to the plate 19. The beveled end 90 of the finger 89 is yieldingly engaged with the web W by a spring 94 fixed at one end to the bracket 93 and the opposite end connected to the free end of an arm 95 fixed to and extending radially from a collar 96 fixed to the pintle in abutting relation to the bracket arm to retain the block 91 in said bracket 93, as shown in Figure 7. The portion of the web held taut by the finger 89 is guided in vertical alinement with rollers 69, 70 by a guide member 97 of channel shape in cross section having the transverse portion arranged with a depending end flange 98 to facilitate the securing of the guide member on a block 99 fixed to the upper face of the plate 19, and the opposite side wall portions of the guide member are positioned between the brackets 72 and arranged with recesses opening to the upper edges to accommodate the shaft 81 of the cam disks 80, as shown at 100 in Figure 8. The finger 89 urges the web W against the transverse portion of the guide member 97. The portion of the web being fed from the rollers 69, 70 is guided to the passage 28 horizontally above the die 16 by a pair of plates 101, 102 of resilient material, plate 101 being straight in cross section and fixed at one end upon a block fixed to the plate 19 in front of the die 16, as shown at 103, with the opposite free end of the plate 101 extending relative to the periphery of the roller 69 to form a scrapper for said roller, as shown in Figures 1 and 8. The other plate 102 is mounted in spaced relation above the plate 101 and having one end portion arranged with laterally extending ears adapted to mount said plate 102 on foot portions of the brackets 72, as shown at 104 in Figures 1, 7 and 8, and the opposite end portion extending obliquely from said mounting portion to the periphery of the roller 70 to act as a scrapper for said roller. The waste portion of the web leaving the passage 28 after the disks D have been severed therefrom by the punch and die, is

guided above the closure caps having the adhesive disks therein by a platform 136 of channel shape in cross section fixed at one end to the apparatus frame 15, as shown at 137, with the channel uppermost and the opposite end terminating above a suitable depository located beyond the periphery of the table 11, not shown.

The web W is supplied to the feeding rollers 69, 70 from a roll or reel 112 rotatably supported by an arm 113 fixed to the shield 64, and to prevent the breaking of the web by the intermittent feeding movement of said rollers, means are provided to prevent the sudden and uneven strain of said intermittent feeding being imparted to the web. This is accomplished by continuously delivering or drawing the web from the roll 112 and providing a slack portion of the web between the roll and the rollers 69, 70, by a pair of feeding rollers 114, 115, roller 114 being fixed on a shaft 116 rotatably mounted in bosses arranged in the bifurcation legs of a bifurcated bracket 117 fixed to the shield 64, as shown in Figures 1 and 3. The other roller 115 is fixed on a shaft 118 rotatably mounted at the opposite end portions in bosses arranged at the free ends of the bifurcation legs of a bifurcated bracket 119 having a boss at the base thereof rotatable on a stud shaft 120 fixed in the bracket 117, whereby the roller 115 may be adjusted toward and away from the roller 114. The roller 115 is yieldingly urged toward the roller 114 by a spring 121 anchored at one end to the shield 64 and the opposite end connected to an arm 122 integral with and extending laterally from the base boss of the bracket 119. The movement of the roller 115 toward the roller 114 is limited by an ear portion 123 integral with and extending from the base boss of the bracket 119 at a right angle to the arm 122 to abut the low portion of an eccentric roller 124 rotatably mounted on a stud 125 fixed in the shield 64. To position the roller 115 from the roller 114 to prevent the drawing of the web from the roll 112 and also facilitate the threading of the web between the rollers 114, 115, the high portion of the eccentric roller 124 is actuated into engagement with the ear portion 123, which engagement will move the ear portion to the right, looking at Figure 1, and lower the arm 122 against the force of the spring 121. The eccentric roller 124 is actuated through an arm 126 integral with said roller and extending from a peripheral portion thereof intermediate the low and high portions and out of the path of the ear portion 123. When the roller 115 is urged toward the roller 114, as shown in Figure 1, said rollers are positively driven one from the other by meshing gears 127 fixed on the shafts 116 and 118, and the shaft 116 is continuously rotated from the drive shaft 52 by the sprocket chain 57 engaging a sprocket wheel 128 fixed on an intermediate portion of a shaft 129 rotatably mounted at spaced portions in bosses at the free ends of the bifurcation legs of the bracket 117. The shaft 129 is operatively connected to the shaft 116 through a train of gears comprising a gear 130 fixed on an end of the shaft 129 extending from the bracket 117 and said gear 130 meshing with an idle gear 131 rotatable on a stud 132 fixed in the bracket 117 with said gear 131 meshing with a gear 133 fixed on the end of the shaft 116 projecting from the bracket 117, as shown in Figure 3. The continuous drawing of the web from the roll 112 by the feeding rollers 114, 115 and the intermittent feeding of the web to the die 16 and punch 20 by the feeding rollers 69, 70 will produce a slack portion of the web between said feeding rollers, and to prevent the accumulation of this slack portion of the web interfering with the operative parts of the apparatus, the portion of the web leaving the rollers 114, 115 is directed over the roll 112, as shown in Figure 2, and into an arcuate guide member comprising a pair of arcuate shaped plates 134 mounted on the beam 41 in spaced relation to each other to form a passage therebetween for the web with the opposite ends of the plates flared outwardly, as shown at 135 in Figure 1, and the lower flaring ends terminating adjacent to the tensioning finger 89.

Having thus described my invention, I claim:

1. In means for severing disks from a web, a punch and die mechanism, a pair of rollers continuously rotated and one of said rollers yieldingly urged toward the other roller to continuously draw the web from a supply roll, a second pair of rollers continuously rotated and a roller of said second pair of rollers having a raised portion on the periphery thereof and mounted with the periphery in spaced relation with the periphery of the other roller of the second pair of rollers and the raised portion cooperating with the periphery of said other roller to feed a predetermined length of web to the punch and die mechanism and means to maintain the web in engagement with the periphery of said other roller of the second pair of rollers to assure instant feeding of the web when the raised portion of the first roller of the second pair of rollers engages the web.

2. Means for severing disks from a web as claimed in claim 1, wherein the roller having the raised peripheral portion is rotatably mounted in a bracket slidably mounted and having lateral extensions, one extension being supported by a fixed pin and the other extension supported by a rotatable cam member, a spring to urge the lateral extensions against the pin and cam member, and means to actuate the cam member to raise the bracket against the force of the spring and prevent feeding of the web to the punch and die mechanism by the second pair of rollers.

3. In means for severing disks from a web as claimed in claim 1, means mounted in front of the second pair of rollers and yieldingly urged to maintain taut the portion of the web between said means and the second pair of rollers.

4. In means for severing disks from a web, a fixed annular die, a punch slidably mounted to have movement into and out of the die, means to feed a web over the die, and means to reciprocate the punch into and out of the die to sever a disk from the web being fed over the die, comprising a pair of disks rotatably mounted in spaced relation to each other and a block pivotally connected at the opposite ends to said pair of disks eccentrically of the axes of rotation of the pair of disks and the center portion of the block adjustably connected to the punch to reciprocate said punch by the circular movement of said block imparted thereto by the rotation of the pair of disks.

5. In means for severing disks from a web, an annular fixed die, a punch slidably mounted to have movement into and out of the die and having an annular cutting edge at one end to cooperate with the die to sever disks from a web and a flat head at the opposite end, means to feed a web over the die, a pair of members

rotatably mounted in spaced relation to each other, a block having portions at the opposite ends pivotally connected to the pair of members eccentrically of the axes of rotation of said members, a tappet pin adjustably carried by the block to engage the flat head of the punch, and a plate releasably carried by the block and having an inwardly flanged edge portion projecting from the block and extending under the head of the punch to maintain the engagement between the tappet pin and punch and operatively connect the punch to the block, whereby the punch is reciprocated into and out of the die by the circular movement of the block imparted to the block by the rotation of the pair of members.

6. In means for severing disks from a web, an annular fixed die, a punch slidably mounted to have movement into and out of the die, a pair of rollers to continuously draw a web from a supply roll, a second pair of rollers mounted adjacent to the punch and die and between the first pair of rollers and the punch and die and having one roller arranged with a raised portion on the periphery thereof to cooperate with its associated roller to intermittently feed a predetermined length of the web to the punch and die, means to maintain the web in contact with the associated roller of the second pair of rollers, a pair of disks rotatably mounted in spaced relation to each other, and a block pivotally mounted at the opposite ends to the pair of the disks eccentrically of the axes of rotation of said disks and loosely and adjustably connected to the punch, whereby the rotation of the pair of disks imparts circular movement to the block in a direction toward and away from the punch and reciprocates the punch into and out of the die to sever disks from the web.

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