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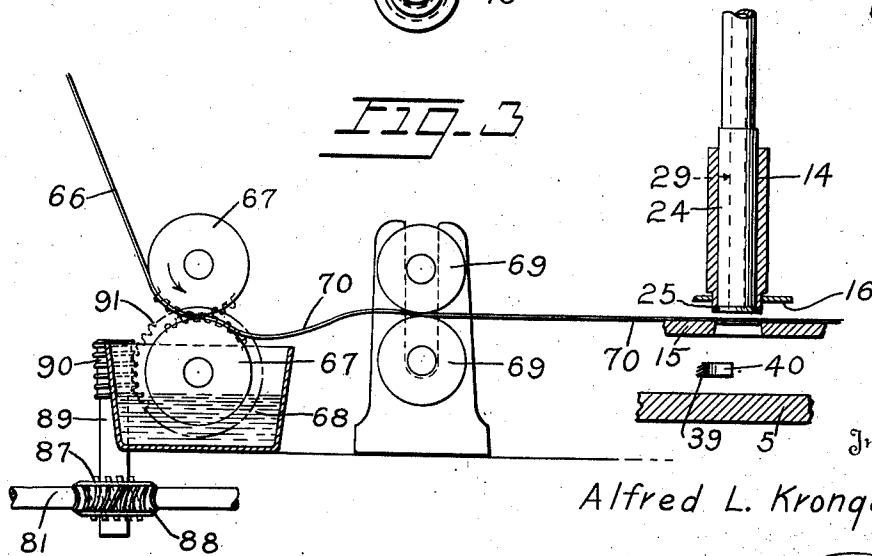
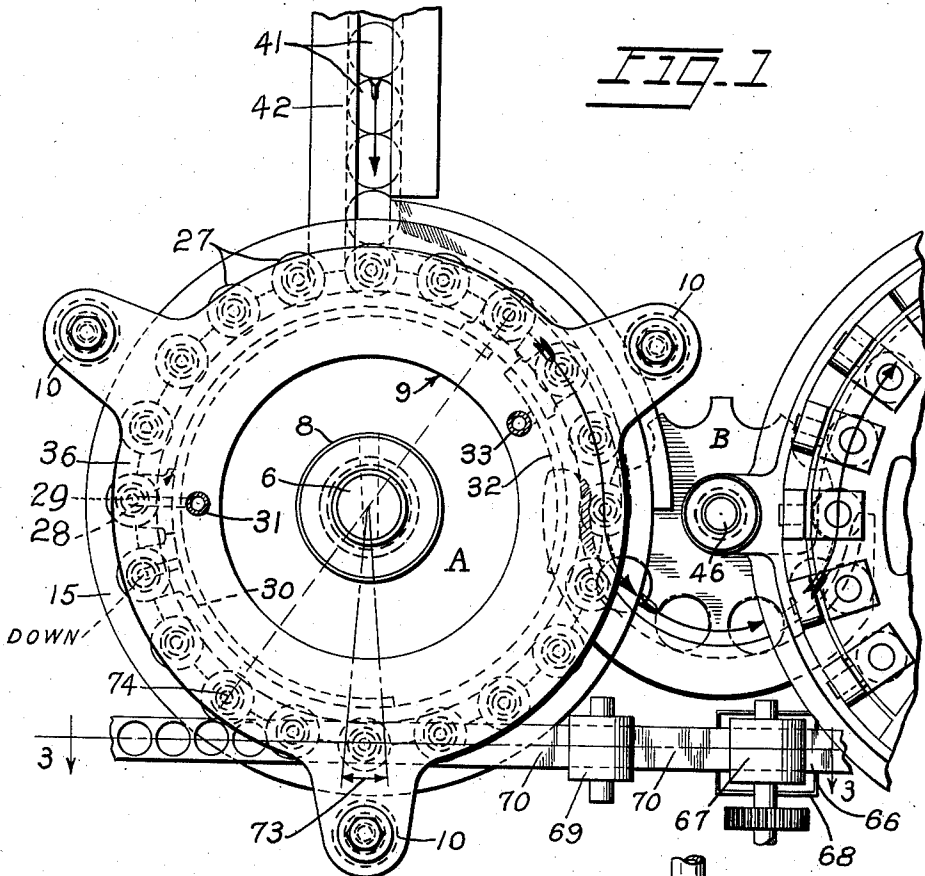
A. L. KRONQUEST

2,218,541

METHOD OF AND APPARATUS FOR FORMING CROWN CAP CENTER SPOTS

Filed Oct. 11, 1938

4 Sheets-Sheet 1



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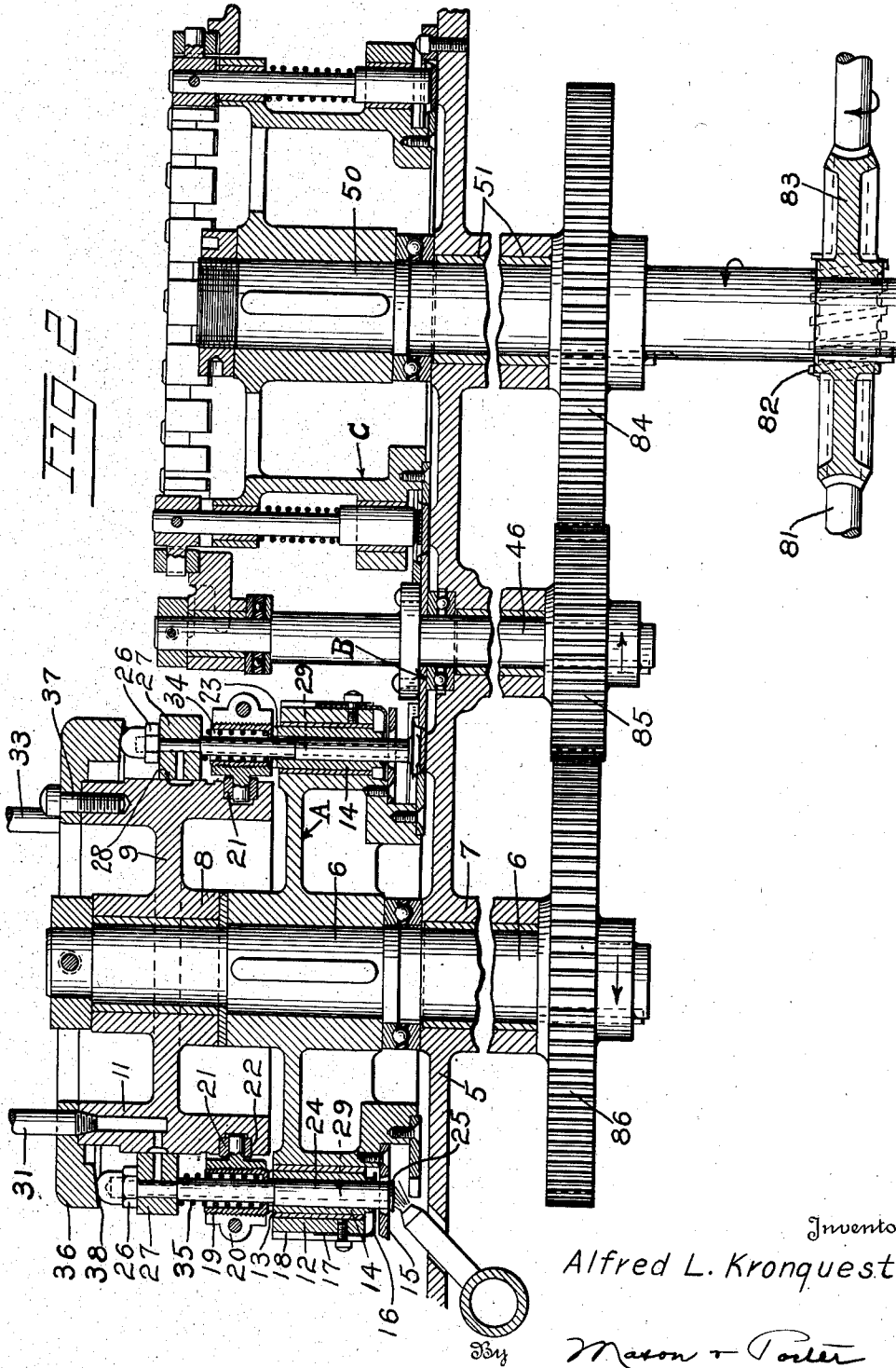
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METHOD OF AND APPARATUS FOR FORMING CROWN CAP CENTER SPOTS

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4 Sheets—Sheet 2



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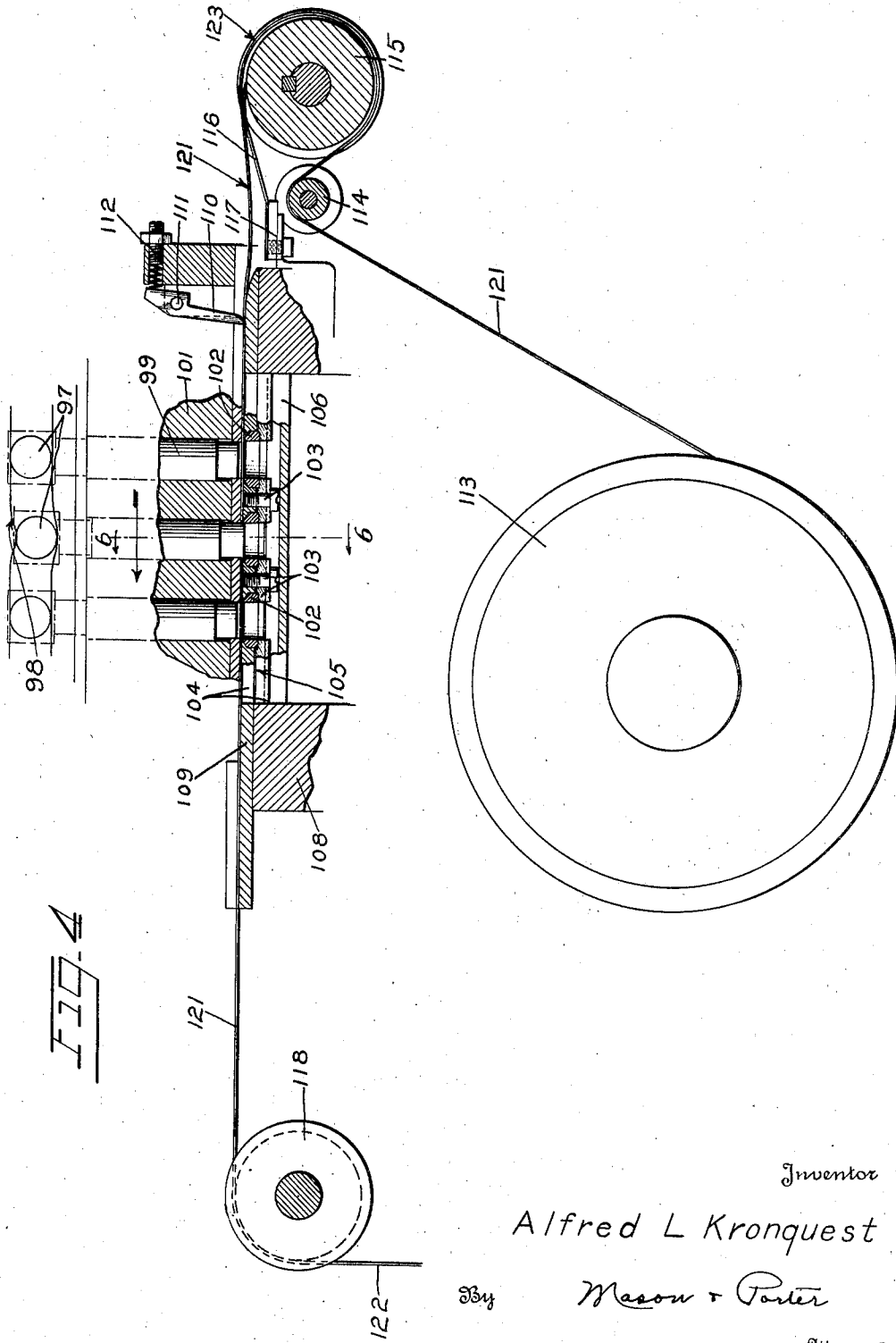
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METHOD OF AND APPARATUS FOR FORMING CROWN CAP CENTER SPOTS

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4 Sheets-Sheet 3



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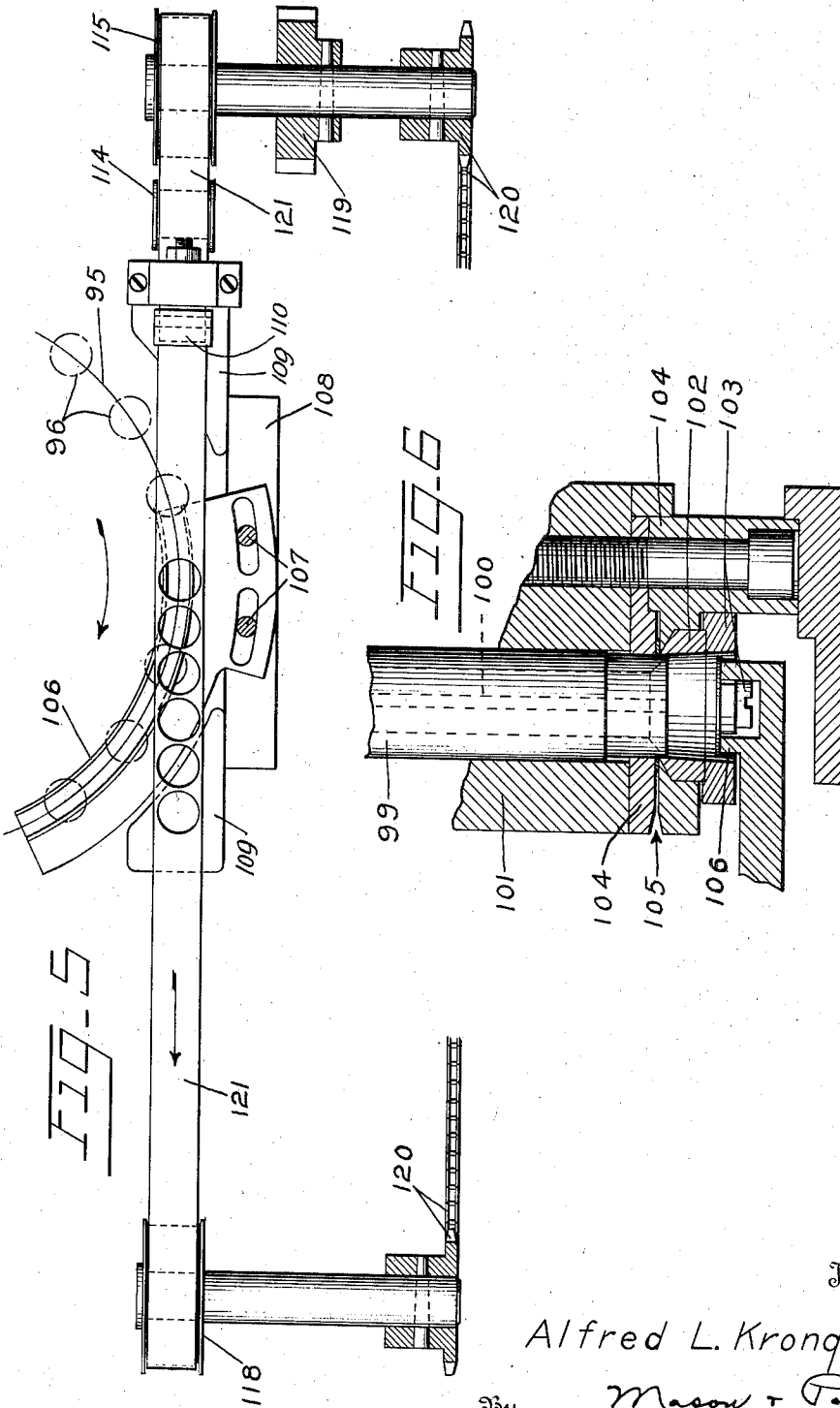
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METHOD OF AND APPARATUS FOR FORMING CROWN CAP CENTER SPOTS

Filed Oct. 11, 1938

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,218,541

METHOD OF AND APPARATUS FOR FORMING CROWN CAP CENTER SPOTS

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Application October 11, 1938, Serial No. 234,496

21 Claims. (Cl. 164—89)

The invention relates generally to the art of assembling closure caps of the well known spotted crown type and primarily seeks to provide a novel method of and apparatus for forming the center spots carried by the sealing pads contained in such caps.

Bottles and other forms of containers for beer or similar beverages usually are sealed by crown caps equipped with pads of cork or other suitable yieldable sealing material faced with liner disks of aluminum or other foil or treated paper so as to prevent direct contact between the beverage and the pad and also to prevent leakage of gases. Such disks preferably are of the "center spot" type which are smaller in diameter than the pads so as to protect the beverage from pad contact and yet permit sealing contact between the container pouring neck and an annulus of the more effective sealing material of the pad. Various methods and apparatus have been developed for forming and affixing center spots and some, which have proven very effective, have employed rolled strip supplies of spot material coated with heat fusible adhesive, heat being applied to render the adhesive soft or tacky and pressure later being applied to set the applied spots. In such methods and apparatus difficulties have been encountered in the handling of the adhesive bearing spot material, in the feeding of the material and in the formation of the spots. To the remedying of these deficiencies my present inventive efforts have been addressed.

Among the objects of the invention is to provide a novel method of conditioning, feeding, and forming spot material and spots formed therefrom which includes, the chilling of the adhesive coated material, the feeding of the material and the formation of spots by reciprocable punches continuously moving in a circular path to which the center line of the strip of spot material bears tangential relation.

Another object of the invention is to provide a novel means for feeding a strip of spot material in a manner for presenting a slack length of strip to the spot punching mechanism, which said means may include devices for chilling the strip to overcome any tendency of an adhesive coating on the strip to become prematurely tacky.

Another object of the invention is to provide a novel spot punching turret which is continuously rotated and carries a circle of equidistantly spaced reciprocable punches, and means for moving the punches into and out of engagement with a strip of spot material having its center line disposed tangentially of the circle of punch centers

for the purpose of punching spots therefrom and for feeding said strip.

This application for Letters Patent is a continuation in part of my co-pending parent application Serial No. 164,823, filed September 20, 1937, and includes among its objects that of providing a novel means for feeding the tangentially disposed spot material strip including a feed roller continuously driven at a surface speed equal to the speed of the translatory movement of the punches and means effective to cause said roller to feed the strip at intervals only.

Another object of the invention is to provide a novel arrangement of scrap feeding roller effective to feed away the scrap strip by drag action alone.

Another object of the invention is to provide a pair of spaced rollers continuously driven at a surface speed corresponding with the speed of translatory movement of the punches and effective to dispose the strip with its center line tangentially of the circle of punch centers, one said roller being a strip feed roller and the other a scrap feed roller, and means engaging the strip between the strip feed roller and the punches and effective to yieldably resist feeding of the strip whereby upon completion of each step feed of the strip occasioned by traveling punch and strip engagement said means will stop forward movement of the strip and cause the strip feed roller to first feed a measure of slack and then rotate ineffectively in said slack.

Another object of the invention is to provide novel means for supporting the formed spots.

With these and other objects in view which will more fully appear, the nature of the invention will be more fully understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a plan view of apparatus embodying the invention;

Figure 2 is a vertical longitudinal section taken through the turret axes;

Figure 3 is a detail vertical section taken along the line 3—3 of Figure 1.

Figure 4 is a somewhat diagrammatic vertical section similar to Figure 3 and illustrating a modified form of the invention.

Figure 5 is a somewhat diagrammatic plan view of the parts shown in Figure 4.

Figure 6 is a detail vertical cross section taken on the line 6—6 on Figure 4.

The apparatus disclosed in Figures 1, 2 and 3 of the drawings and which constitutes one form of apparatus which I have devised in the practical development of the invention, comprises a divisible part of the complete apparatus disclosed in my parent application for Letters Patent, Serial No. 164,823, filed September 20, 1937, as illustrative of an example of mechanism adaptable to the practicing of my improved method of spotting crown caps, and embodying a table 5, a punch turret A on which the center spots are formed and applied to the crown caps, a transfer turret B, and a spot setting turret C to which the assembled and center spotted crown caps are delivered by the transfer turret and on which presser plungers engage the center spots and serve to permanently secure them to the cap pads to which they are applied.

The turrets A, B and C rotate about vertical axes above the table 5, as shown in Fig. 2, and the turret A is supported upon a shaft 6 rotatable in a bearing 7 formed in the table and in a vertically aligned bearing 8 formed in a casting 9 stationarily supported as at 10 above the table and including a ring portion 11. The turret A proper comprises a rotor 12 secured upon the shaft 6 and provided adjacent its peripheral edge with a plurality of equidistantly spaced sleeve-bushed bores 13 vertically disposed with their axes arranged in a circle as shown in Fig. 1. Twenty such bores are shown in the drawings but it is to be understood that a greater or lesser number may be provided if desired.

A punch sleeve 14 is reciprocable in and through each turret bore 13, and each punch element cooperates with a die opening in a die ring or plate 15 removably secured to the rotor 12 as shown in Fig. 2. Each punch element also passes through an individual guard and stripper finger 16 which overlies the ring 15 in adjacent but spaced relation and which includes a vertical leg adjustably secured as at 17 in the groove way 18 provided therefor in the peripheral face of the rotor 12.

At its upper end, each punch sleeve is externally threaded as at 19 and is vertically adjustable in an individual clamp head 20 carrying an actuator roller 21 movable in a cam groove 22 formed in the peripheral face of the casting ring 11. It will be obvious that by inserting a suitable tool in one of the receiving sockets 23 provided in a punch sleeve, the sleeve can be rotated to adjust the relation of its cutting end and the cooperating die plate aperture.

Each of the punch sleeves 14 carries a spot carrying and applying plunger 24 which is reciprocable in and through the sleeve bore independently of movement of said sleeve. These plungers have flared lower ends 25 and the sleeves are recessed at their lower ends to receive said flared ends. At its upper end, each plunger 24 is shouldered, and secured by an actuator nut head 26, to an individual valve block 27 having an arcuate face 28 machined to snugly engage the peripheral face of the ring 11 and partake of movements of rotation and reciprocation thereon. An air duct 29 is formed in and through each plunger 24 and its associated block 27, and these ducts are adapted to communicate, during certain intervals with a suction duct 30 formed in and extending a distance about the ring 11 as shown in Figure 1. The suction duct is constantly evacuated through a pipe line 31 leading to any suitable exhausting mechanism (not shown). At other intervals the ducts 29 cooper-

ate with a pressure duct 32 similarly formed in the ring 11 and connected by a pipe line 33 with any suitable source of air under pressure (not shown).

A counterbore 34 is formed in the upper end of each sleeve 14, and a spring 35 is coiled about the respective plunger 24 and engages at its respective ends with the valve block 27 and the counterbore end so as to tend to force the plunger and sleeve of the unit in opposite directions, the sleeve downwardly and the plunger upwardly. The cam groove 22 resists the downward movement of the sleeves 14, and movement upward of the plungers 24, under urge of the springs 35, is resisted by a cam ring 36 secured as at 37 upon the casting ring 11 and having a cam surface 38 engaged by the actuator nut heads 26 of the plungers for the purpose of controlling the positions of said plungers.

The crown caps 41 to which the formed spots are applied are fed into the machine as at 42, have the spots applied thereto, and are transferred by the turret B to the finishing turret C whereon they have permanent setting pressure applied to them and from which they are discharged, all as described in detail in the parent case disclosure hereinbefore referred to. Since the pneumatic controls, heat application, the spot applying, cap transferring, and the spot pressing features form no part of the invention herein claimed, and are described in detail in the parent case, further detailed description of these features is thought to be unnecessary herein.

The spot setting turret C rotates with a vertically disposed shaft 50 rotatable in a bearing 51 formed in the table 5, as shown in Fig. 2.

A strip 66 of heat fusible adhesive coated foil is fed from a supply roll (not shown) by an opposed pair of positively driven feed rollers 67, one of which is cooled by a suitable chilling medium so as to prevent the foil strip becoming tacky prior to the punch-forming function thereupon. One means for so cooling the adhesive strip comprises a cooling liquid bath 68 in which the lower feed roller dips as shown in Fig. 3. Between the feed rollers 67 and the punching or spot forming station the fed strip 66 is engaged by a drag roll equipment 69 which retards the strip and provides a slack portion therein. These roller equipments present a strip portion 70 with its center line tangentially of the circle of punch unit centers and between the die plate 15 and overlying stripper fingers 16 as shown in Figs. 1 and 3 of the drawings. The rollers 69 can be dispensed with if desired and the strip portion 70 fed at the same speed at which the punch units travel through the feed sector hereinafter referred to. The chilling medium or cooling liquid bath 68 herein referred to may be water or any other liquid which will effect the desired cooling of the heat fusible adhesive on the strip 66 without dissolving or softening said adhesive. Substantially all heat fusible adhesives are non-soluble in water, and because of its availability and cheapness, water constitutes the preferred chilling medium.

The spots are punch-formed at a point in the circumference of the turret A diametrically opposite that at which the crown caps are fed in. It should be understood that the turret A rotates continuously, and in forming the spots the punch sleeves are serially reciprocated through the tangentially disposed foil strip at the place indicated. By thus reciprocating the punch units during rotation of the turret, each unit remains in the

strip during an interval of travel and thus imparts a feed movement to the slack portion 70 of the strip. The cam groove 22 includes a portion so positioned and shaped as to impart the desired reciprocation to each passing punch unit, and this movement of reciprocation is so timed with respect to the movement of rotation of the turret that each feed movement imparted to the strip portion 70 exceeds only slightly the diameter of the formed spots as shown in Fig. 1. The sector of turret circumference in which the strip feed occurs is indicated at 73 in Fig. 1, and it will be noted that the sector is centered on a line drawn radially from the center of the turret and bearing normal or right angular relation to the tangentially disposed strip portion 70. In this manner it is possible to utilize the punch units to feed the strip without imparting to the strip objectionable tearing strains.

The flared head 25 of each plunger 24 engages the end of the associated punch sleeve 14 and the plungers are moved with the sleeves during each spot-punch reciprocation thereof.

The cam surface 38 of the cam ring 36 is so shaped that it causes the plungers 24 to start moving down out of the associated punch sleeves at 74, just after the plungers have cleared the foil strip portion 70.

Any suitable means may be employed for imparting continuous rotation to the turrets A, B and C. As an example, I have shown a drive shaft 81 equipped with a worm 82 for imparting rotation to a worm wheel 83 carried by the shaft 50 of the turret C. Rotation of the shaft 50 may be transmitted to the turrets B and A by intermeshing spur gears 84, 85 and 86 mounted respectively on the shafts 50, 46 and 6.

A worm 87 may be mounted on the shaft 61 to impart rotation, through the worm wheel 88, shaft 89, worm 90 and worm wheel 91, to the strip feeding rollers 67. It is to be understood that the rollers 67 merely draw off the foil strip from the supply roll and present it, as before stated, in a given relation to the punch units, thus relieving the punch units of the effort of so drawing off the strip. The real feeding of the strip, however, is occasioned by the combined reciprocatory and translatory movement of the punch units.

In Figures 4, 5 and 6 of the drawings, I have illustrated a modified form of spot material strip positioning and feeding equipment. In these figures I have diagrammatically indicated the circle of punches as at 95, the punch units being designated 96. The punch actuators are diagrammatically illustrated at 97 and the control cam 98.

Each punch unit includes a punch sleeve 99 and a suction plunger 100 reciprocable within the sleeve, and the punch units are reciprocable in equidistantly spaced vertical bores in a turret 101 rotatable about its axis so as to impart continuous translatory movement to the punch units 96 about the punch circle or orbital path indicated at 95 in Figure 5.

The punches cooperate with die blocks 102 removably secured as at 103 in the supporting ring 104 carried by the turret and composed of upper and lower sections spaced as at 105 to accommodate the tangentially disposed spot material strip.

A formed spot supporting sector 106 is adjustably supported as at 107 on the machine framing 108. The framing also supports table portions 109 over which the spot material strip is fed in the manner illustrated in Figure 4.

Just in advance of the sector in which the turret punches effectively engage the spot material strip

for the purpose of feeding the same and punching spots therefrom, is mounted a spring pressed strip stop finger 110. The finger 110 is pivotally supported upon the framing as at 111 and is spring pressed to yieldably hold the strip against the underlying table portion 109. The degree of compression of the finger spring may be adjusted by the means illustrated in Figure 4 of the drawings and generally designated 112.

The aluminum foil or other spot material strip 10 is fed from a supply reel 113 over an idler roller 114 and about a strip feed roller 115. It will be observed by reference to Figure 4 of the drawings that the rollers 114 and 115 are so related that the spot material strip is carried in a loop about the feed roller 115 and in position for frictionally engaging at least 200° of the circumference of said feed roller.

A stripper blade 116 is adjustably supported as at 117 upon the framing and extends into engagement with the feed roller 115 for the purpose of overcoming any tendency of the strip to adhere to said roller. See Figure 4.

A scrap drag roller 118 cooperates with the feed roller 115 in positioning the strip tangentially of the punch circle 95. Rotation is imparted to the feed roller 115 by any suitable gearing connection generally designated 119, and the rotation of the roller 115 is imparted to the roller 118 by suitable transmission connections 120.

It is to be understood that the rollers 115 and 118 are driven at the same surface speed and that the surface speed of these rollers is the same as the speed of translatory movement imparted to the punch units 96. Any suitable drive means may be employed for coordinating the speeds of movement of the rollers 115 and 118 and the turret 101, examples of such drive connections being shown in Figures 2, 3 and 5 of the drawings.

The spot material strip is designated 121 and the free end or scrap portion thereof from which spots have been punched passes freely over the drag roller 118 as indicated at 122. The roller 118 thus engages the strip throughout only 90° of its circumference and by this means imparts sufficient drag to the free end of the strip to support it in the position illustrated in Figures 4 and 5 of the drawings. The drag roller 118 does not actually impart any feeding movement to the strip 121.

In this form of the invention, and in the form previously described, the actual feeding of the strip 121 is accomplished by the punch units 96 which are moved continuously about the punch circle 95 and move into engagement with, through and then out of engagement with the strip 121 while moving bodily through the sector indicated at 73 in Figure 1 of the drawings. By reason of the engagement of the units with the strip 121 through the sector 73, feeding movement is imparted by said units to said strip. The stop finger 110, under spring tension, rests on the strip 121 and allows no slack to occur between the stop finger and the effective punch unit. Each time the effective punch unit disengages the strip upon completion of its travel through the sector 73, the finger 110 will stop forward movement of the strip and the roller 118 will drag freely beneath the free end of the strip.

Each time forward movement of the strip is thus stopped by the finger 110, the continuously rotating feed roller 115 is caused to first form a measure of slack in that portion of the strip looped about the roller 115 between the roller 114

and the finger 110, and then to rotate ineffectively in the slack loop 123 thus formed.

As the punch unit next effectively moves into engagement with the strip 121, it will impart a step movement thereto while passing through the sector 73, and during the initial portion of this step feed movement of the strip the slack loop 123 will tighten about the roller 115 and again render this roller effective for another feeding interval until the strip is again stopped by the finger 110 when the slack forming operation above described will be repeated.

In the spot forming and controlling means disclosed in the parent case, and in Figures 1 to 3 herein, the spots were pneumatically held and carried by the suction plungers immediately upon formation of the spots. This control of the spots is subject to change, and in some cases it might be desirable to have the spots attached to and suction or carrier plungers 100 only after the punch units 96 have moved away from the spot material strip 121. In such cases the formed spots will fall upon and be supported on and dragged along the spaced ribs of the sector 106 until they are engaged by and become pneumatically attached to said plungers.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the manner of practicing my improved spot forming method, and the manner of constructing and operating my improved spot forming apparatus will be well understood by those skilled in the art to which the invention relates.

I claim:

1. In a method of forming crown cap pad facing liner disks from a strip of material bearing a heat fusible adhesive not soluble in water, the steps of first subjecting the strip to the chilling effect of contact with cool water, and then punching disks from the strip while it remains so chilled.

2. In apparatus for forming crown cap liner disks, the combination of a forming punch, means including a pair of rollers for feeding a strip of liner disk material toward the punch to be engaged thereby, said strip being coated with a heat fusible adhesive not soluble in water, one said roller being immersed in cooling water and serving to wet the strip with the water to render it non-tacky.

3. In apparatus for forming crown cap center spots, the combination of a spot forming punch, means for feeding a strip of spot material toward the punch, means positioned between the feeding means and the punch for imparting a drag on the strip to provide a slack portion between the feeding means and the punch, means for reciprocating the punch to cut spots from the strip, and means for moving the punch bodily and continuously in an orbital path including the general direction of the length of the strip whereby to impart feed movement to the strip slack portion during the interval of engagement between punch and strip.

4. In crown cap center spotting apparatus, means for feeding a strip of spot material, means for imparting a drag on the fed strip to provide a slack portion, a punch, and means for reciprocating the punch through the strip and for moving the punch bodily and continuously in an orbital path including the general direction of the length of the strip whereby to form spots and impart feed movement to said slackened strip portion.

5. In crown cap center spotting apparatus, a plurality of equidistantly spaced reciprocable punches disposed with their collective axes of re-

ciprocation arranged in a circle, means for disposing a strip of spot material beneath the punches and with its center line tangentially of said circle, and means for continuously rotating the circle of punches about an axis disposed perpendicularly to the plane occupied by said strip and for serially reciprocating the punches to cause successive punches to form spots and impart step-by-step feed movement to the strip during each punching operation.

6. In crown cap center spotting apparatus, a plurality of equidistantly spaced reciprocable punches disposed with their collective axes of reciprocation arranged in a circle, means for feeding a strip of spot material toward the punches with its center line tangentially of said circle, means for forming a slack portion in said strip between the feeding means and the punches, and means for continuously rotating the circle of punches about an axis disposed perpendicularly to the plane occupied by said strip and for serially reciprocating the punches to cause successive punches to form spots and impart feed movement to the slack portion of the strip during each punching operation.

7. In crown cap center spotting apparatus, a plurality of equidistantly spaced reciprocable punches disposed with their collective axes of reciprocation arranged in a circle, means for feeding a strip of liner disk material toward the punches with its center line tangentially of said circle, said strip being coated with a heat fusible adhesive not soluble in water, means for forming a slack portion in said strip between the feeding means and the punches, means for continuously rotating the circle of punches about an axis disposed perpendicularly to the plane occupied by said strip and for serially reciprocating the punches to cause successive punches to form spots and impart feed movement to the slack portion of the strip during each punching operation, said strip feeding means including a pair of feed rollers, and means for bathing one of the rollers in cooling water to be applied thereby to said strip.

8. In crown cap center spotting apparatus, a plurality of equidistantly spaced reciprocable punches disposed with their collective axes of reciprocation arranged in a circle, means for disposing a strip of spot material beneath the punches and with its center line tangentially of said circle, means for continuously rotating the circle of punches about an axis disposed perpendicularly to the plane occupied by said strip, and means for serially reciprocating the punches in timed relation to cause successive punches to form spots and impart feed movement to the strip during each punching operation and in steps each exceeding only slightly the diameter of the formed spots.

9. In crown cap center spotting apparatus, a plurality of equidistantly spaced reciprocable punches disposed with their collective axes of reciprocation arranged in a circle, means for disposing a strip of spot material beneath the punches and with its center line tangentially of said circle, means for continuously rotating the circle of punches about an axis disposed perpendicularly to the plane occupied by said strip, and means for serially reciprocating the punches to cause successive punches to form spots and impart feed movement to the strip during each punching operation and in steps each exceeding only slightly the diameter of the formed spots, said last named means being timed to center each

interval of punch and strip contact on a line drawn radially from the center of said circle and bearing right angular relation to the length of said strip.

5 10. In apparatus of the character described, a continuously driven feed roller, a strip of spot material looped about a portion of said roller to frictionally engage the roller and be fed there-
10 by, punch means, and means for imparting translatory and reciprocatory movement to said punch means to cause it to punch spots from said strip and to impart successive step feed move-
15 ments to said strip, said feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of
20 the strip.

11. In apparatus of the character described, punch means continuously moved in an orbital path and reciprocated for punching purposes while being moved, a strip feed roller, and means
25 including an idler roller for supporting a strip of spot material in position for being engaged by said punch means for having spots punched therefrom and step feed movements imparted thereto, and with a loop thereof about at least
30 200° of the circumference of the feed roller, said feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed
35 engagement with the feed roller following initiation of each step movement of the strip.

12. In apparatus of the character described, punch means continuously moved in an orbital path and reciprocated for punching purposes while being moved, and means including a strip
40 feed roller for supporting a strip of spot material in position for being engaged by said punch means for having spots punched therefrom and step feed movements imparted thereto by said punch means and with a loop thereof about the feed roller, said
45 feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed
50 engagement with the feed roller following initiation of each step movement of the strip.

13. In apparatus of the character described, punch means continuously moved in an orbital path and reciprocated for punching purposes while being moved, means including a strip feed
55 roller for supporting a strip of spot material in position for being engaged by said punch means for having spots punched therefrom and step feed movements imparted thereto by said punch means and with a loop thereof about the feed roller, said feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed
60 engagement with the feed roller following initiation of each step movement of the strip, and a scrap feed roller over which the punched portion of the strip is freely suspended whereby said
65 punched portion is yieldably dragged from said punch means.

14. In apparatus of the character described, punch means continuously moved in an orbital path and reciprocated for punching purposes

while being moved, means including a strip feed roller for supporting a strip of spot material in position for being engaged by said punch means for having spots punched therefrom and step feed
5 movements imparted thereto by said punch means and with a loop thereof about the feed roller, said feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought
10 into feed engagement with the feed roller following initiation of each step movement of the strip, and a scrap feed roller over which the punched portion of the strip is freely suspended whereby said punched portion is yieldably
15 dragged from said punch means, said rollers being driven at a like surface speed corresponding to the speed of orbital path movement of said punch means.

15. In apparatus of the character described, a plurality of equidistantly spaced reciprocable punches disposed with their axes of reciprocation arranged in a circle, means including a strip feed
25 roller for supporting a strip of spot material tangentially of said circle and beneath said punches whereby the punches will successively move through along with and out of the strip to punch spots from and impart step feed movements to
30 said strip and with a loop of said strip about said feed roller, said feed roller being disposed at the strip approach side of said punches whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step
35 movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of the strip.

16. In crown cap center spotting apparatus, a plurality of equidistantly spaced reciprocable punches disposed with their collective axes of reciprocation arranged in a circle, means for disposing a strip of spot material beneath the punches and tangentially of said circle, means
45 for continuously rotating the circle of punches and for serially reciprocating the punches to cause successive punches to form spots and impart step-by-step feed movement to the strip during each punching operation, and an arcuate supporting sector disposed beneath the punches
50 and aligned with said circle for receiving and supporting spots formed by said punches.

17. In apparatus of the character described, a plurality of equidistantly spaced reciprocable punches disposed with their axes of reciprocation arranged in a circle, means including a strip feed roller and a scrap feed roller for supporting a strip of spot material tangentially of said circle and beneath said punches whereby the punches will successively move through along with and
60 out of the strip to punch spots from and impart step feed movements to said strip and with a loop of said strip about said feed roller, said feed roller being disposed at the strip approach side of said punches whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of the strip, and said
65 scrap feed roller being disposed beyond said punches and having the punched portion of the strip freely suspended thereover whereby said punched portion is yieldably dragged from said punch means.

18. In apparatus of the character described, a plurality of equidistantly spaced reciprocable punches disposed with their axes of reciprocation arranged in a circle, means including a strip feed roller and a scrap feed roller for supporting a strip of spot material tangentially of said circle and beneath said punches whereby the punches will successively move through along with and out of the strip to punch spots from and impart step feed movements to said strip and with a loop of said strip about said feed roller, said feed roller being disposed at the strip approach side of said punches whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of the strip, and said scrap feed roller being disposed beyond said punches and having the punched portion of the strip freely suspended thereover whereby said punched portion is yieldably dragged from said punch means, said rollers being driven at a like surface speed corresponding to the speed of movement of the punches about said circle.

19. In apparatus of the character described, a continuously driven feed roller, a strip of spot material looped about a portion of said roller to frictionally engage the roller and be fed thereby, punch means, means for imparting translatory and reciprocatory movement to said punch means to cause it to punch spots from said strip and to impart successive step feed movements to said strip, said feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of the strip, and means disposed between said feed roller and said punch means for yieldably gripping said strip to arrest movement thereof upon completion of each step movement of said strip.

20. In apparatus of the character described, a

continuously driven feed roller, a strip of spot material looped about a portion of said roller to frictionally engage the roller and be fed thereby, punch means, means for imparting translatory and reciprocatory movement to said punch means to cause it to punch spots from said strip and to impart successive step feed movements to said strip, said feed roller being disposed in advance of said punch means whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of the strip, means disposed between said feed roller and said punch means for yieldably gripping said strip to arrest movement thereof upon completion of each step movement of said strip, and means disposed beyond the punch means to constantly engage the punched portion of the strip in wiping contact to draw it away from said punch means.

21. In apparatus of the character described, a plurality of equidistantly spaced reciprocable punches disposed with their axes of reciprocation arranged in a circle, means including a strip feed roller for supporting a strip of spot material tangentially of said circle and beneath said punches whereby the punches will successively move through along with and out of the strip to punch spots from and impart step feed movements to said strip and with a loop of said strip about said feed roller, said feed roller being disposed at the strip approach side of said punches whereby the strip loop will be slackened and the feed roller rendered ineffective upon completion of each step movement of the strip and said loop again brought into feed engagement with the feed roller following initiation of each step movement of the strip, and means including a spring urged stop finger disposed between said feed roller and said punch means for yieldably gripping said strip to arrest movement thereof upon completion of each step movement of said strip.

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