(No Model.) 3 Sheets—Sheet 1.

A. L. BERNARDIN.

MACHINE FOR CLINCHING BOTTLE CAPS.

No. 374,517. Patented Dec. 6, 1887.

Fig. 1.

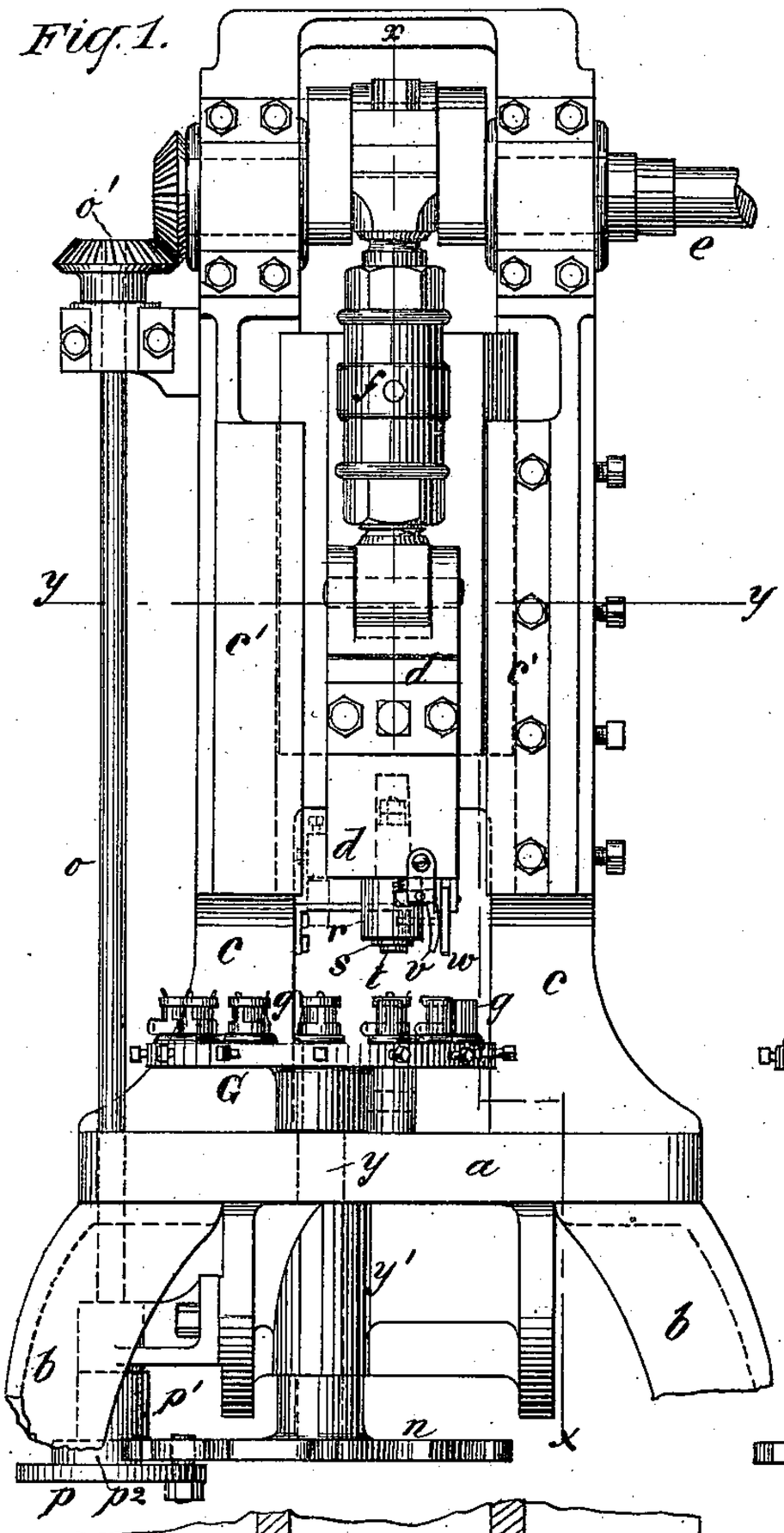


Fig. 2.

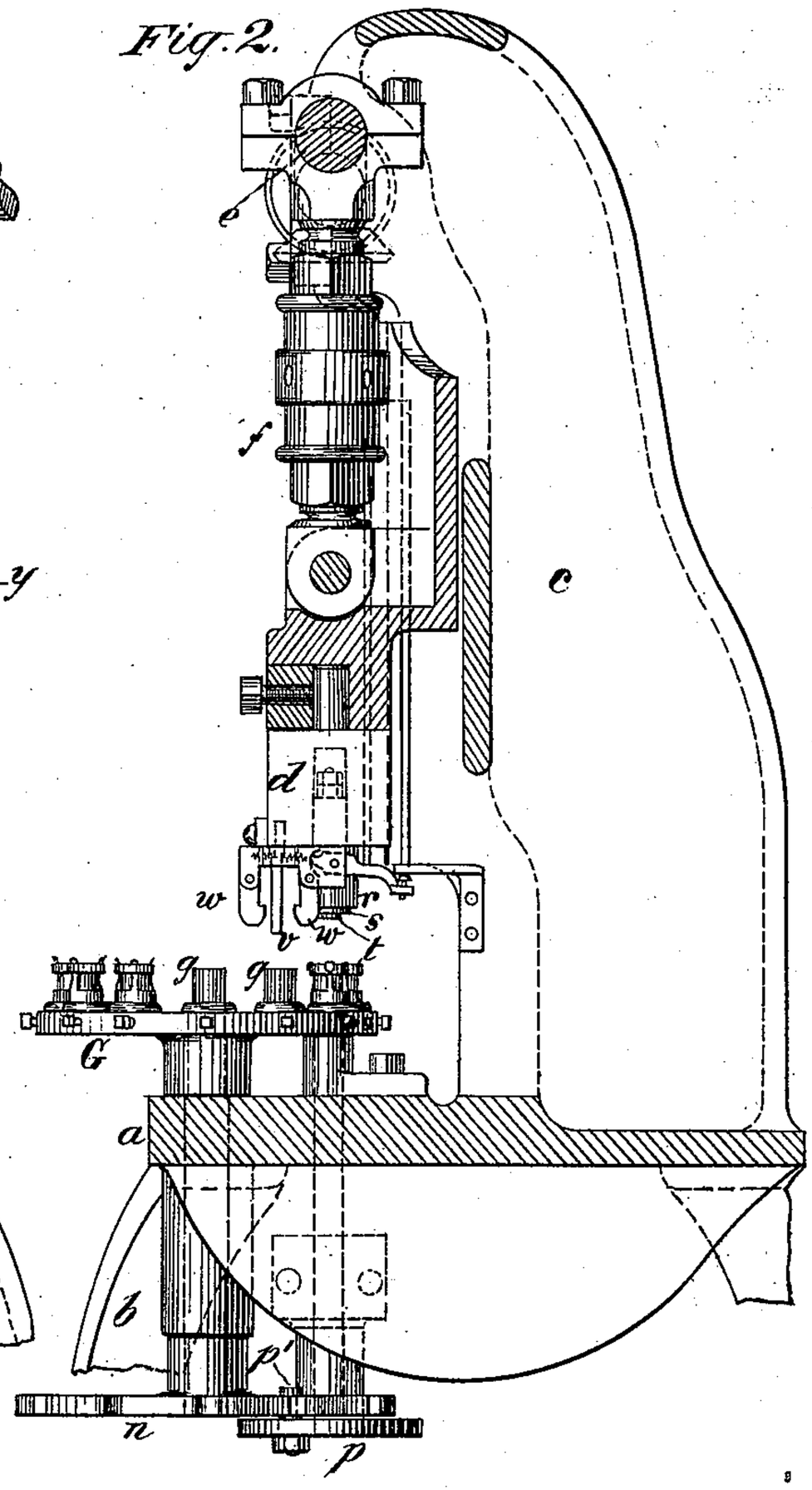


Fig. 3.

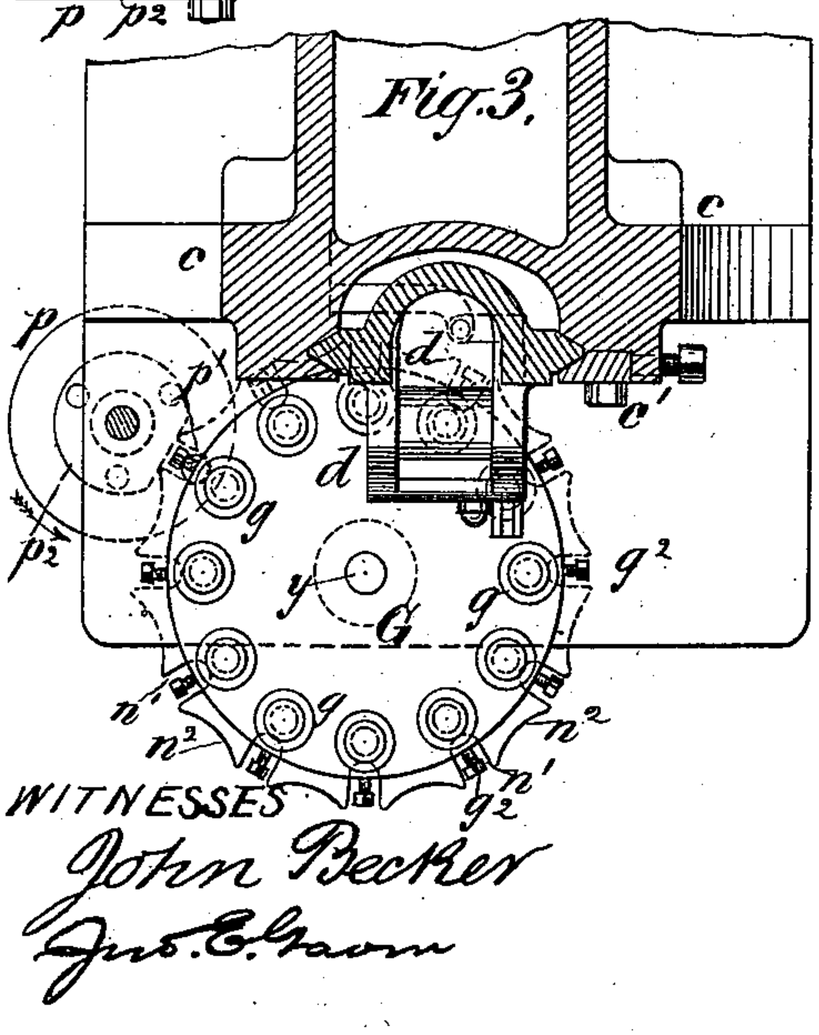
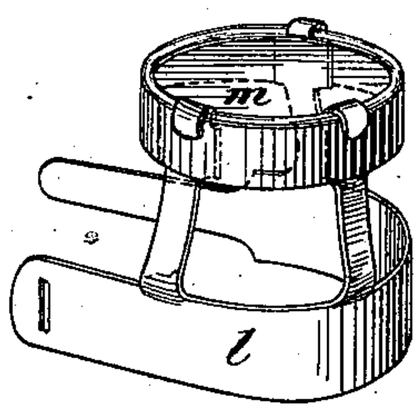


Fig. 4.



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(No Model.) 3 Sheets—Sheet 2.

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MACHINE FOR CLINCHING BOTTLE CAPS.

No. 374,517. Patented Dec. 6, 1887.

Fig. 5.

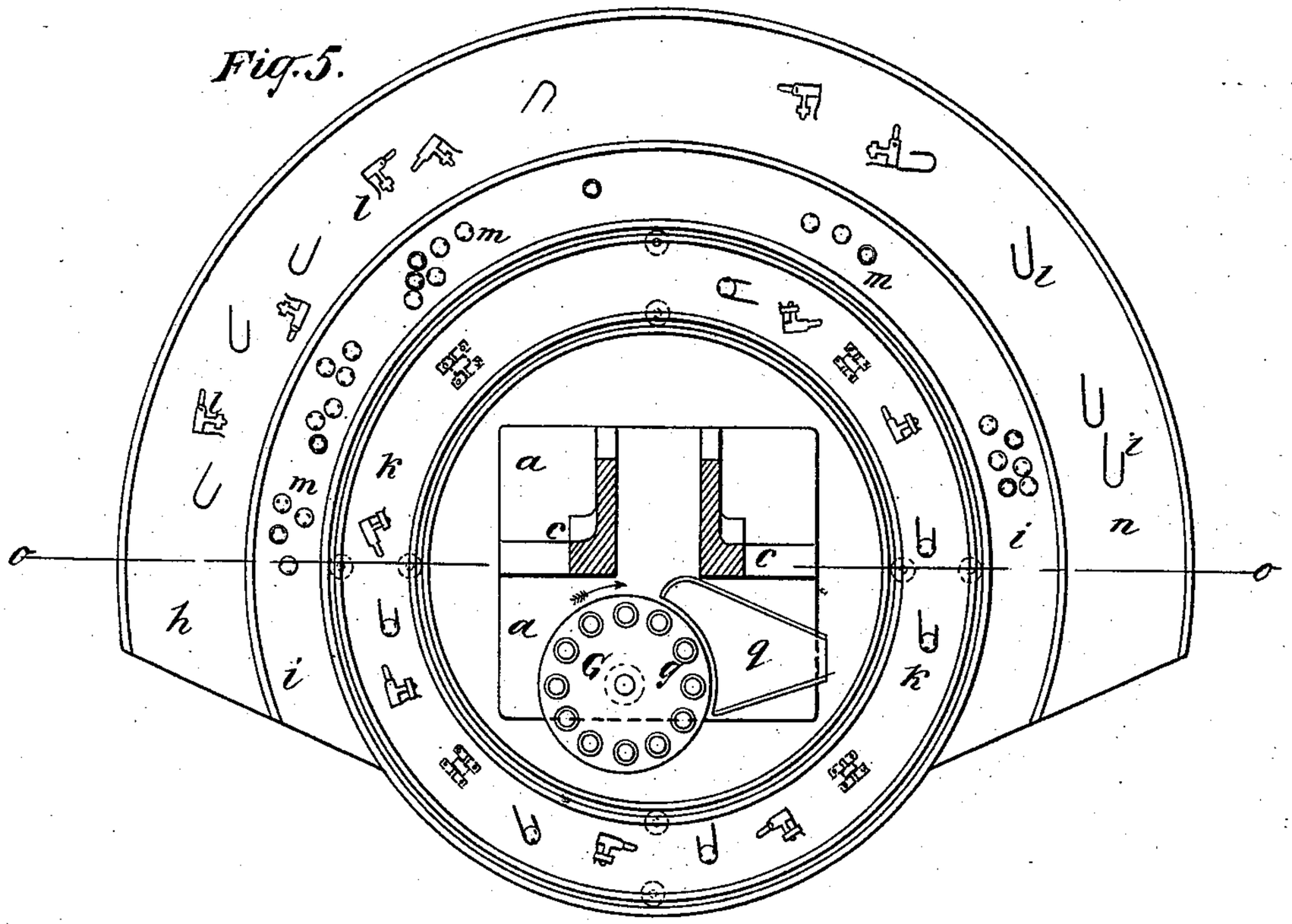
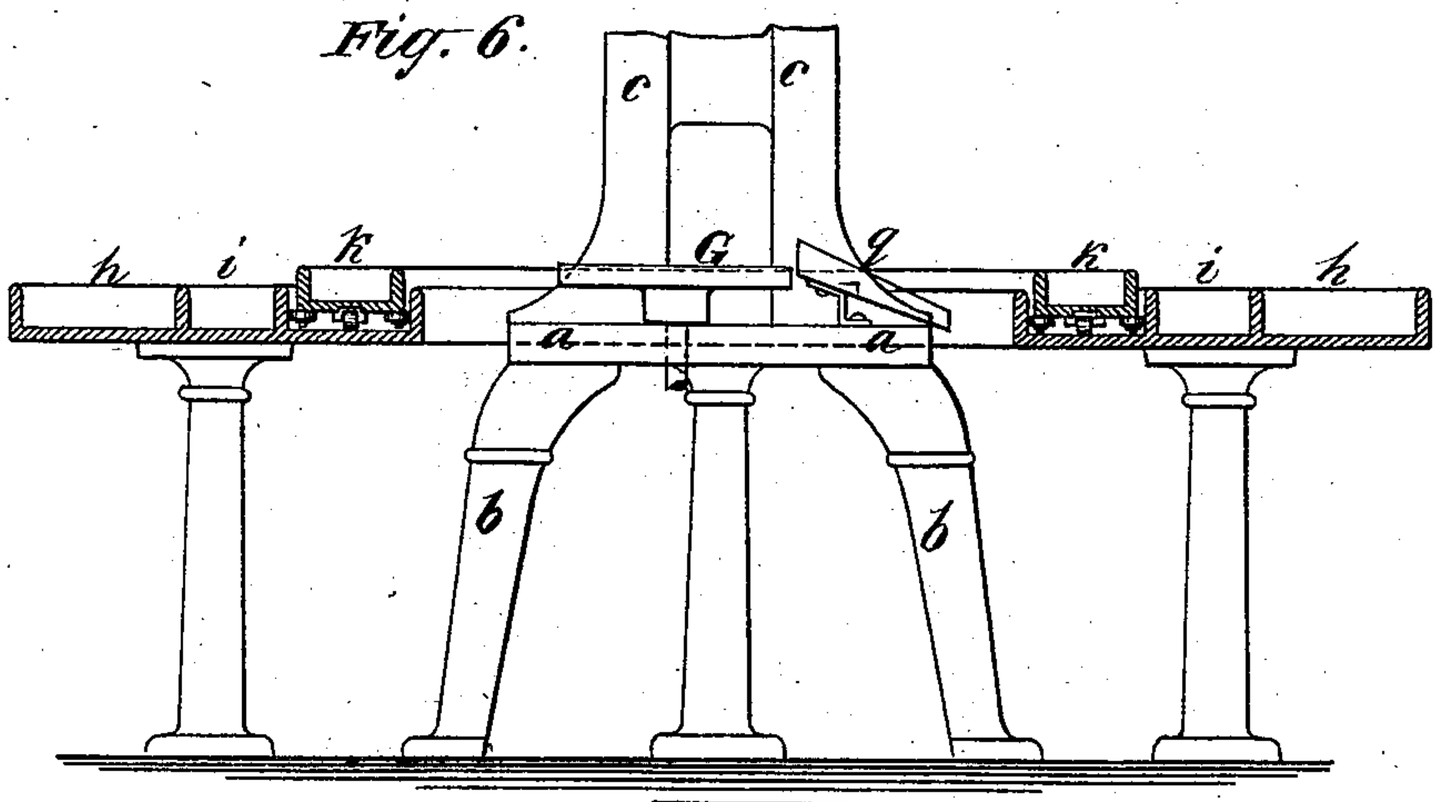


Fig. 6.



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MACHINE FOR CLINCHING BOTTLE CAPS.

No. 374,517. Patented Dec. 6, 1887.

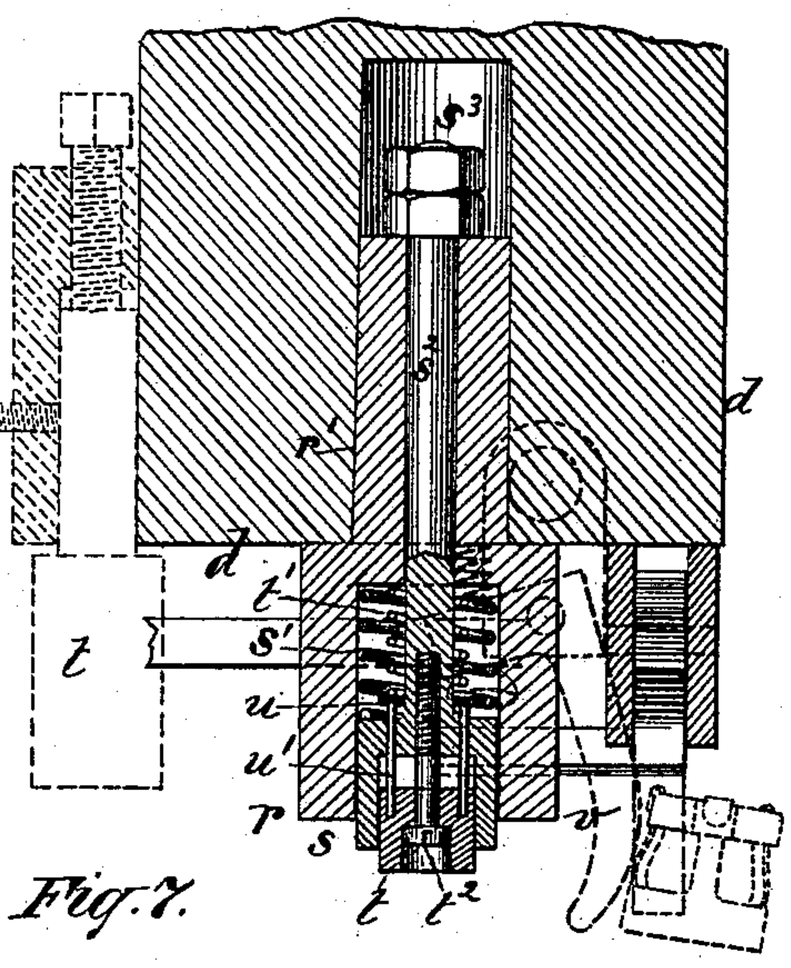


Fig. 7.

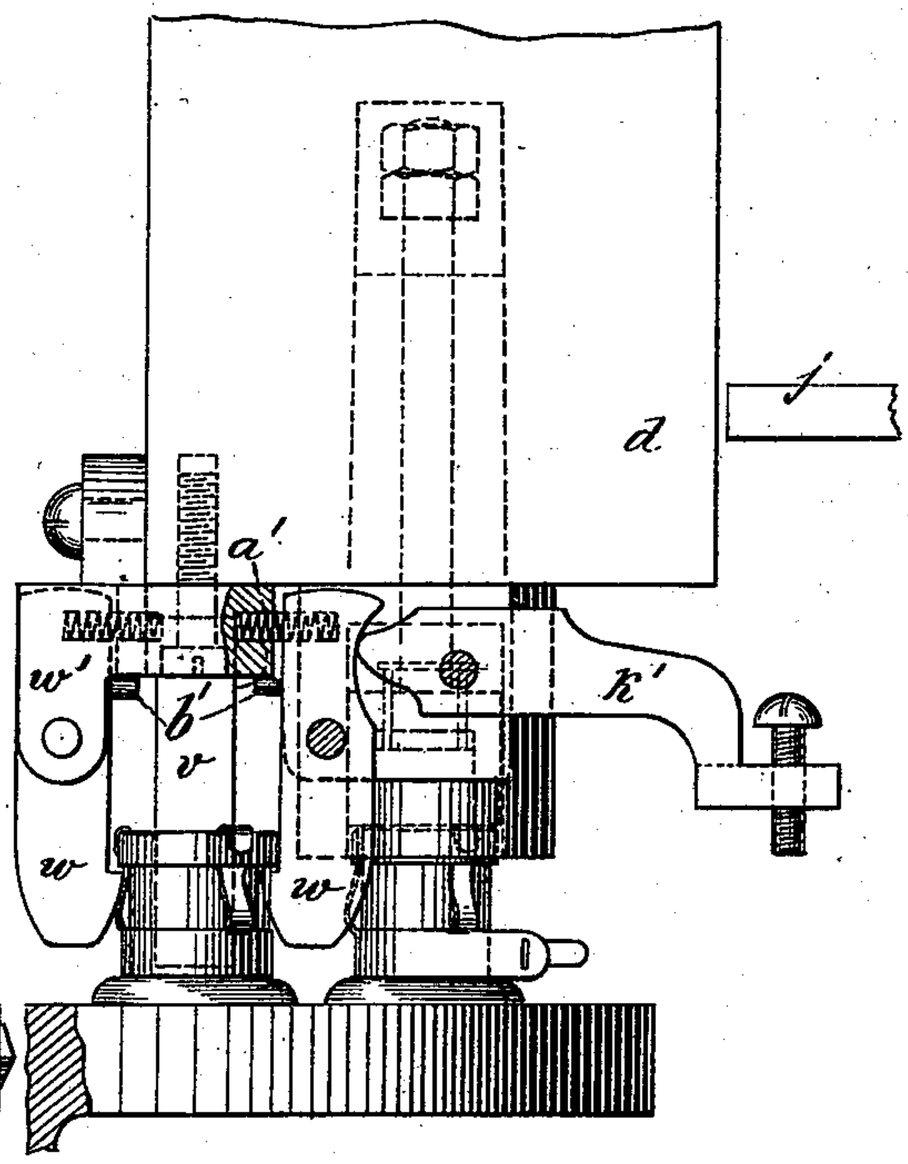
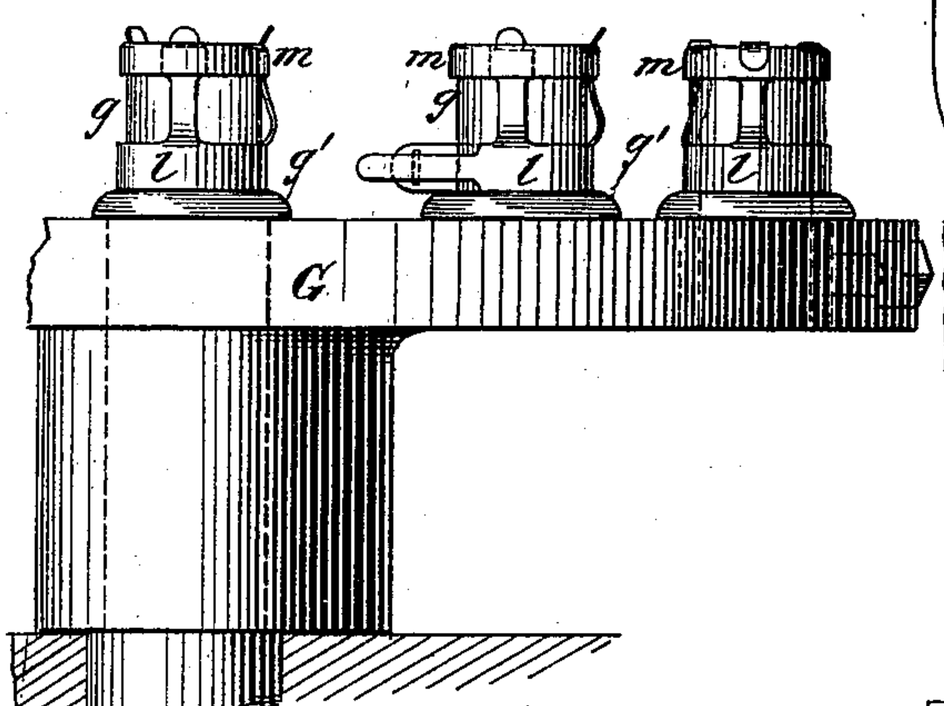


Fig. 9.



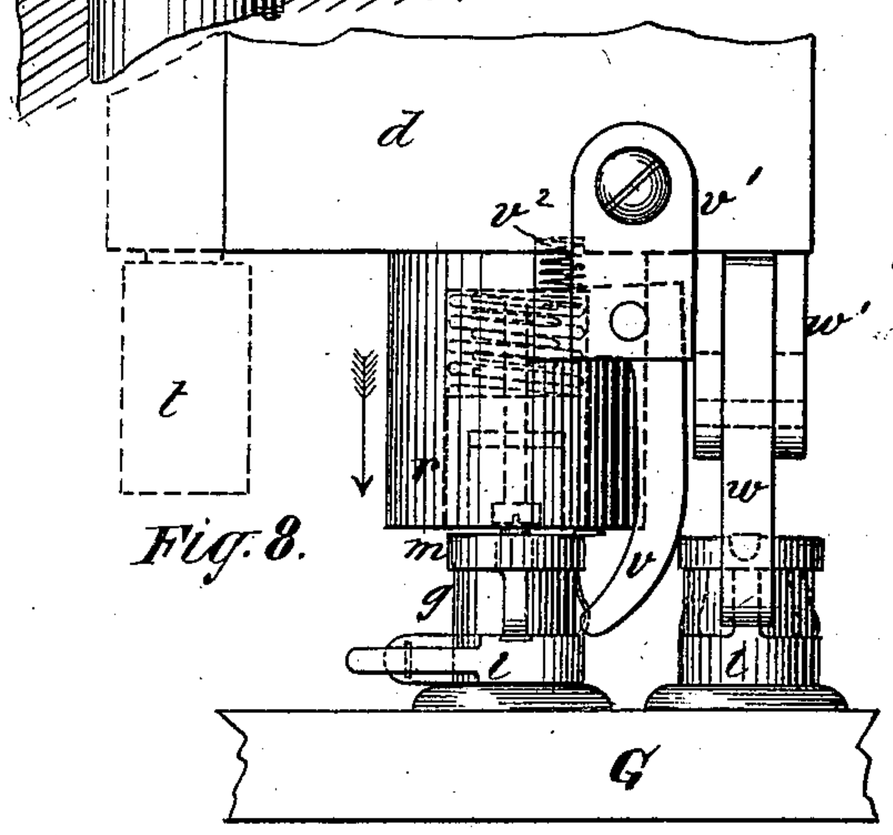


Fig. 8.

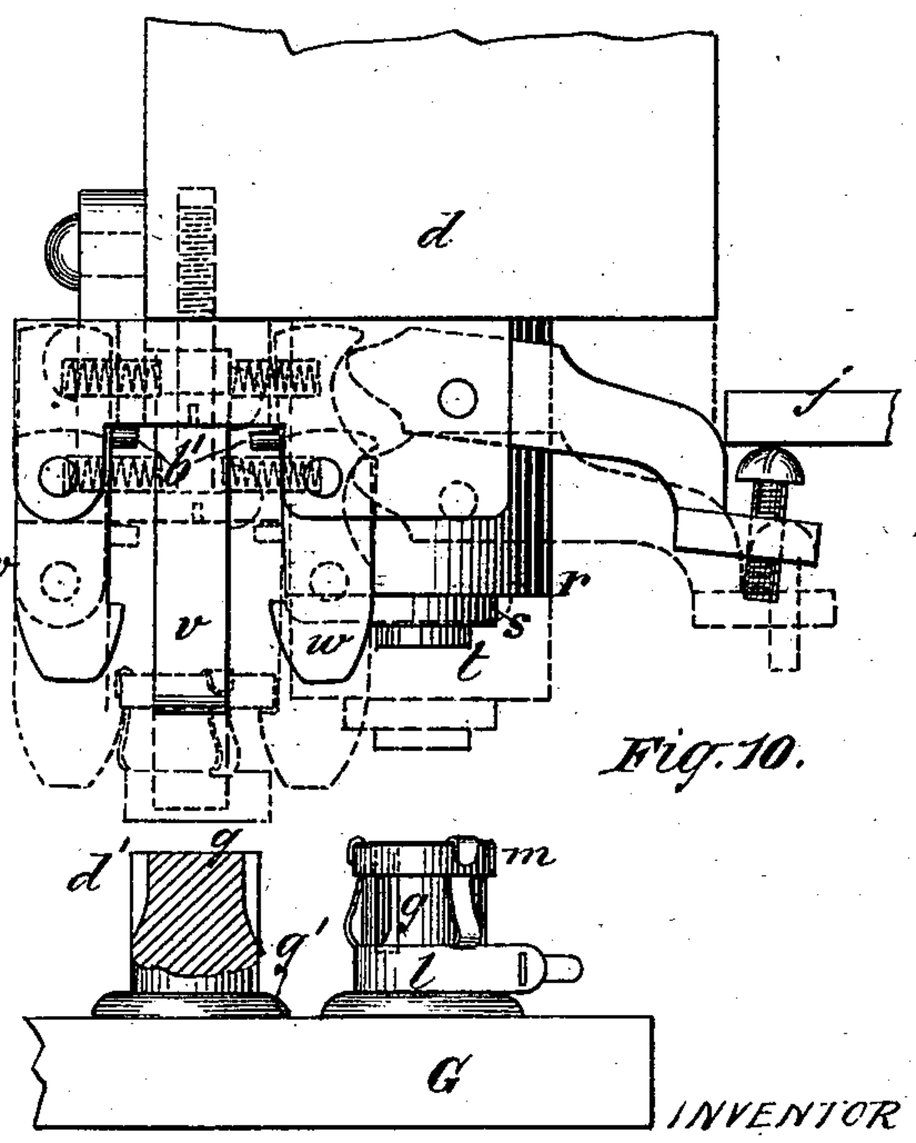


Fig. 10.

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UNITED STATES PATENT OFFICE.

ALFRED L. BERNARDIN, OF EVANSVILLE, INDIANA.

MACHINE FOR CLINCHING BOTTLE-CAPS.

SPECIFICATION forming part of Letters Patent No. 374,517, dated December 6, 1887.

Application filed February 10, 1887. Serial No. 227,107. (No model.)

To all whom it may concern:

Be it known that I, ALFRED L. BERNARDIN, of Evansville, Vanderburg county, Indiana, have invented certain new and useful Machines for Clinching or Completing Bottle-Caps, of which the following is a specification.

My invention relates to the manufacture of that class of sheet-metal bottle-caps such as shown in my former Patents Nos. 314,358 and 314,359, of March 24, 1885, which consists, briefly, of a neck-band adapted to buckle around the neck of the bottle, and having three upright arms or prongs which are clinched to a rimmed cap which fits over the cork.

My present machine is designed only to fasten the rimmed cap firmly to the pronged neck-band by clinching the ends of the prongs over the slotted edge of the cap, the assembled neck-bands and caps being supplied to the machine.

My improved machine therefore consists, briefly, of an intermittently-rotating table, around the periphery of which is arranged a series of upright anvil-posts over which the capped neck-bands are placed to be clinched and a series of reciprocating plungers under which the posts are brought successively. The inner or central one of the plungers first descends upon the center of the cap to force it firmly to its seat on the post and over the prongs of the band, after which a second plunger descends and flattens down the prongs at right angles, while a third plunger, which is annular or tubular, descends around the cap, and thus bends or clinches the ends of the prongs straight down over the edge of the cap. The plunger-slide also carries two hooked jaws or claws, which at the descent catch under the rim of the cap, and which on the ascent raise the clinched cap and its band off the post, while a lateral spring ejecting-arm ejects the same out of the grasp of the jaws, which at the same time open to allow of the ejection. Successive reciprocations thus clinch and eject the finished caps, the loose bands and caps being constantly fed onto the empty posts by the attendant. This clinching-machine is placed in the center of an annular rotating table or trough, which is supplied with the assembled caps and bands by separate attendants ready to be put upon the anvil-posts by the feeder. Around this rotary table are placed two concentric troughs, holding, respectively, the neck-bands and caps, from which they are taken and put together by the attendants grouped around the troughs, and then placed in the rotary trough to be passed to the feeder.

My invention therefore consists in the several features above outlined, as hereinafter fully set forth and claimed.

In the annexed drawings, Figure 1 presents a front elevation of my improved machine, and Fig. 2 is a side elevation thereof, partly in section, on line *x x*. Fig. 3 is a sectional plan on line *y y*. Fig. 4 is a perspective view of the finished bottle-cap, illustrating the clinching or finishing work done by the machine. Fig. 5 is a general plan view including the rotary table and the concentric troughs surrounding the centrally-arranged clinching-machine. Fig. 6 is a section of Fig. 5 on *o o*. Fig. 7 is an enlarged fragmentary front elevation and section of the anvil-table and reciprocating plungers, &c., the latter being shown at the top of the stroke. Fig. 8 is a front elevation of the same parts, showing the plungers near the end of the downstroke, the first and second plungers having descended on the work. Fig. 9 is a side elevation of the same parts with all three plungers depressed over the work to complete the clinching. Fig. 10 is a side elevation of the same parts at the top of the next stroke, where the work previously clinched is removed and ejected.

Referring to Figs. 1, 2, and 3, it may be seen that my invention is combined with or embodied in an ordinary form of die-press. *a* indicates the bed or table of the press, and *b* the legs on which the same rests. *c c* are the upright overhanging arms of the press, having the usual guides, *c'*, in which the cross-head slide *d* works. On the top of the arms or standards *c* is journaled the main crank-shaft *e*, to which the power is applied, and which is connected by the usual adjustable pitman, *f*, with the cross-head *d*. Now, to the lower end of the cross-head are attached the series of concentric plungers, which perform the clinching operations, and also the detaching and ejecting devices, which detach and eject the clinched work, as will hereinafter clearly ap-

pear. Below the cross-head and plungers on the bed *a* is arranged the intermittently-rotating table G, having the series of upright anvil-posts *g* around the edge of the same, and which is so placed relatively to the cross-head that as the table is revolved the posts pass successively under the cross-head to bring the successive posts to register with the plungers, so as to clinch the work put upon said posts, as will be understood from Figs. 1, 2, and 3.

Now, Fig. 4 shows the bottle-cap on which the machine operates to complete the same, and which consists simply of a buckling sheet-metal neck-band, *l*, having three arms extending up therefrom to join with a rimmed cap, *m*, having three slots near the edge, through which the prongs on the shouldered tips of the arms project, and which prongs are bent or clinched down over the rim of the cap, thus uniting the two parts firmly together, the present machine performing simply this clinching operation to unite the caps and bands.

Now, referring to Figs. 5 and 6, it may be seen that the clinching-machine is placed at the center of two concentric troughs, *h i*, and centrally within a rotary annular table, *k*. The troughs *h i* are supplied, respectively, with the neck-bands *l* and the caps *m*, which go to form the bottle-caps, and a number of girls or other attendants, seated at intervals around the troughs, put the caps upon the prongs of the neck-bands and place the assembled parts in the rotary annular trough or table *k*, as seen in Fig. 5, from which the feeder stationed in front of the machine takes the same and slips them successively over the anvil-posts *g* on the rotary anvil-table G, which carries them under the clinching-plungers of the reciprocating cross-head, as seen in Figs. 1, 2, and 3.

When the work is first slipped upon the anvil-posts, the lower edge of the neck-bands rests on a shoulder, *g'*, at the base of the posts, while the prongs of the neck-band project above the caps *m*, with a slight outward divergence, as seen in Fig. 7; but after receiving the action of the plungers these diverging prongs are bent and clinched firmly down over the edge of the cap, as is well shown in Figs. 7, 8, 9, and 10.

Now, the clinching-plungers are preferably three in number, arranged concentrically, as best shown at *r s t* in Fig. 7, and are all attached to and operated by the cross-head *d*. (See also Figs. 1 and 2.) The outer or largest plunger, *r*, is tubular and of a size to fit over and encircle the cap and its clinched prongs, (see Figs. 7 and 9,) and it is fixed solidly to the end of the cross-head, as seen best in Fig. 7, having a shouldered shank, *r'*, which fits into a socket in the cross-head. Within the outer tubular plunger, *r*, is fitted an intermediate plunger, *s*, which is also preferably tubular and of a size to fit the bore of the outer plunger, *r*, and cover the top of the bottle-cap, while within this intermediate plunger, *s*, is a central plunger, *t*, which is adapted to fit upon the center of the bottle-cap within the diverged prongs, as well shown in Fig. 7. Now, while the plunger *r* has a solid connection with the cross-head the central plunger, *t*, and the intermediate plunger, *s*, have both a yielding or elastic connection with the cross-head by means of interposed springs *t' s'*.

The plunger *s* is formed with a central stem or bolt, s^2, which passes up through the tubular shank of the plunger *s*, and is provided with jam-nuts s^3 at the upper end, which prevent the plunger from falling out of place. The central plunger, *t*, is held in the plunger *s* by a screw, t^2, the head of which fits into a deep recess in the plunger *t*, and thus permits the play of the plunger *t* in the plunger *s*.

The respective plungers normally protrude in telescopic order, as seen in Fig. 7, the central plunger, *t*, protruding about an eighth of an inch from the plunger *s*, while the latter protrudes about the same distance from the plunger *r*. The spring *t'* of the plunger *t* bears at one end against the socket in the plunger *r* and at the other end upon a washer, *u*, from which pins *u'* extend through the plunger *s* and are fastened to the plunger *t*, thus keeping the plunger normally protruded. The spring *s'* of the plunger *s* bears at one end against the bottom of the socket in the plunger *r* and at the opposite end directly against the plunger *s*, thus keeping the same protruded, as seen in Fig. 7. It will therefore be now understood, referring to Fig. 7, that when the plungers are forced by the descent of the cross-head against the bottle-cap on the anvil-post below, the central plunger, *t*, will first strike the center of the cap within the diverging prongs, and the farther descent of the cross-head will compress the spring *s' t'*, and thus press the plunger *t* against the cap with a firm elastic pressure, which will tighten it well down over the projecting prongs of the neck-band and force the cap firmly to its seat on the post. The farther descent of the cross-head will then force the middle plunger, *s*, down upon the diverged prongs, as seen in Fig. 8, thus flattening the same straight out radially. At this point the continued descent of the cross-head will compress the spring *s'* of the plunger *s*, and at the same time cause the outer tubular plunger, *r*, to descend against the outbent prongs, and to thence pass down over the cap, (see Figs. 8 and 9,) thus bending the prongs straight down over the edge of the cap, and thus clinching the cap firmly on the neck-band, as will be readily understood from Figs. 4, 7, 8, and 9. As the plungers descend to thus clinch together the parts of the bottle-cap on one anvil-post, a curved ejector-lever, *v*, (see Figs. 7, 8, and 9,) pivoted to an ear, *v'*, on the cross-head, will be moved down between the anvil-post under the plungers and the next adjacent post containing the bottle-cap previously clinched. The curved edge of this lever, riding cam-like upon the edge of the clinched cap, as seen in Fig.

8, will cause the lever to be swayed to one side against the action of a spring, v^2, acting on its short arm, thus applying a lateral ejecting pressure upon the clinched bottle-cap. At the same time that the ejector-lever descends cam-like against the clinched cap, as described, two hooked pawl-jaws, *w*, are forced down over the cap and catch with a hook-like action under the edge of the cap, as seen in Figs. 8 and 9. These jaws are pivoted between cheek-plates *w'*, fixed on the lower end of the cross-head, and are acted upon by springs *a'*, which tend to close them in their grasping position, limited by the stops *b'*. It will therefore be now understood, referring to Figs. 8 and 9, that when the cross-head ascends the hooked jaws *w* will lift the clinched cap off the post, as shown by the dotted lines in Fig. 10, and as the cross-head arrives near the top of its stroke a tripping-lever, *k'*, pivoted on the cheeks *w'*, will strike a fixed stop, *j*, which will thus force its short arm against a cam-face on the short arm of one of the hooked jaws *w*, and thus diverge the jaw, allowing the grasp of the jaws to relax upon the cap, at which moment the spring-acted ejector-lever *v* will now fly out against the cap, as shown by dotted lines in Fig. 7, and thus eject the same laterally from between the hooked jaws and thereby throw the clinched cap over the edge of the anvil-table into a chute, *q*, (see Figs. 5 and 6,) suitably placed, as shown, to conduct the caps to a proper receptacle below.

Now, after the clinched cap is removed and ejected, as described, and during the idle upper portion of the crank's throw, the anvil-table is revolved one step to bring the next anvil-post with its unclinched cap into position beneath the plungers, which descend thereon at the next downsweep of the crank. The mechanism for thus intermittently rotating the anvil-table is shown in Figs. 1, 2, and 3, by referring to which it will be noted that the anvil-table is mounted on the top of a vertical shaft, *y*, which rotates in a bearing, *y'*, cast on the table *a*, and to the lower end of this shaft is fixed a wheel, *n*, having around its periphery a series of notches, *n'*, corresponding with the anvil-posts *g*, and also curved gaps or concaves n^2 between said notches.

An upright shaft, *o*, supported in bearings in the table *a* and arm *c*, is geared at the upper end with the main shaft *e* by the miter-gearing *o'*, and at the lower end is provided with a wheel, *p*, having a projecting stud, *p'*, which engages the successive notches *n'* in the wheel *n*, and thus moves the wheel and anvil-table in successive steps to bring the successive posts under the clinching-plungers.

It will be seen that the shaft *o* and wheel *p* will make one complete revolution to every revolution of the main crank-shaft *e*, and hence after every clinching-stroke of the cross-head and plungers the anvil-table will be advanced one step, the parts being so timed that the advance of the anvil-table takes place during the idle upper sweep of the crank over the dead-center.

It will be also noticed, referring to Fig. 3, that the wheel *p* has a hub, *p'*, in coincidence with the edge of the wheel *n*, the curve of which hub fits the curve of the concave recesses or gaps n^2 in the wheel *n*. This hub is, however, flattened or cut away in the direction of a chord in line with the stud *p'*, so as to permit the wheel to revolve past the hub when engaged by the stud *p'*; but as soon as the stud has moved the table one step and commences to pass out of engagement with the notch the curved part of the hub will revolve into coincidence with the next succeeding gap or concave n^2, and thus act as a stop or lock to hold the notched wheel and the anvil-table in the position into which it was moved by the stud, so that the anvil-post will remain immovably under the clinching-plungers and in true register therewith during the clinching-stroke, as will be readily understood by inspection of Figs. 1, 2, and 3.

As illustrated in Figs. 1, 2, and 3, the anvil-posts *g* are preferably removably secured in the anvil-table by the set-screws g^2, and, as shown best in Fig. 10, the sides of the anvil-posts are grooved or fluted with three grooves, *d'*, into which the curved arms of the neck-bands may fit.

It will be readily seen, on reference to Fig. 7, that the use of the central plunger, *t*, and intermediate plunger, *s*, is not absolutely necessary and may be omitted, particularly the plunger *t*; but it is preferable to retain them. Furthermore, it is not absolutely necessary that the plungers be arranged concentric, as they may be arranged in successive positions on the cross-head, all, however, to descend simultaneously on successive anvil-posts, so that the unclinched cap will first receive the action of one plunger and then pass at the next step under the next plunger, and so on. I prefer, however, to have the two chief plungers *r s* concentric, and to arrange the central plunger, *t*, at one side of the same, as shown by dotted lines in Figs. 7 and 10, having a solid but adjustable connection with the cross-head, as indicated in Fig. 7. Hence in this modification, at the downstroke the plunger *t* will descend upon the unclinched cap on one anvil-post, while the plungers *r s* will descend on the next succeeding cap, which had previously received the action of the plunger *t*, and thus complete the work on the next adjacent post. This modification makes the construction of the plungers simpler and stronger, and is therefore preferable, as it will produce work as fast as the three concentric plungers.

With the series of clinching plungers acting substantially as shown, any suitable means for feeding the unclinched caps under the same may be adopted without departing from the leading feature of my machine; but I prefer the particular means shown. Where the rotary

table having the anvil-posts is used, any suitable mechanical movement for imparting a step-by-step rotation thereto coincident with the strokes of the plungers may be adopted; but I prefer what I have shown.

What I claim as my invention is—

1. In a machine for clinching the pronged neck-bands of bottle-caps to the rimmed caps or tops, the combination, with an anvil-post on which the loose parts are placed, of a tubular plunger adapted to descend upon the projecting prongs and around the cap and anvil-post, and thereby bend or clinch the prongs over the edge and down the sides of said caps and anvil-posts, with suitable means for reciprocating the said plunger, substantially as herein set forth.

2. The combination, in a machine for clinching bottle-caps, with an anvil-post on which the loose cap is placed, of a reciprocating plunger, such as *s*, adapted to descend upon the projecting prongs of the neck-band within the limits of the cap, and a tubular plunger, such as *r*, adapted to descend around the cap after the descent of the plunger *r*, with suitable means for operating said plungers successively, substantially as and for the purpose set forth.

3. In a machine for clinching or completing bottle-caps, the combination, with an anvil-post on which the loose parts are placed, of the three successively-acting plungers *t s r*, substantially as and for the purpose set forth.

4. In a machine for clinching bottle-caps, the combination, with the tubular plunger *r*, of an inner plunger, *s*, a cushion-spring, *s'*, to said plunger *s*, and a common reciprocating device to which both of said plungers are attached, substantially as shown and described.

5. In a machine for clinching bottle-caps, the combination, with anvil-posts on which the work is placed, of a reciprocating holder, such as *d*, reciprocated to and from said post, with the plungers *r* and *s*, attached to said reciprocating holder, and a cushion-spring, *s'*, bearing on the plunger *s*, substantially as shown and described.

6. In a machine substantially such as set forth, the combination, with an anvil-post to hold the work, and a reciprocating holder, such as *d*, reciprocating to and from the table, of the plungers *r s t* and interposed springs *s' t'*, arranged and operating substantially as and for the purpose set forth.

7. In a machine substantially such as set forth, the combination, with an intermittently-rotating table provided with a series of anvil-posts on which the work is placed, of a reciprocating holder, such as *d*, adapted to reciprocate to and from said rotating anvil-table, and a tubular plunger, such as *r*, carried by said holder and adapted to descend down around each successive anvil-post and the work thereon during the pauses in the intermittent motion of said table, substantially as shown and described.

8. In a machine such as set forth, the combination, with an intermittently-rotating table, G, provided with anvil-posts *g*, of a reciprocating holder, such as *d*, reciprocating to and from the successive posts, with successively-acting plungers *r* and *t*, carried by said holder, arranged and operating substantially as shown and described.

9. The combination, with the intermittently-rotating table G, having anvil-posts *g*, of the reciprocating holder *d* and successively-acting series of plungers *r s t*, carried by said holder, together with suitable motive devices to reciprocate said holder and plungers and intermittently rotate the table in due relation with each other, substantially as shown and described.

10. The combination, with the crank-shaft *e* and cross-head *d*, reciprocated thereby, with a clinching plunger or plungers attached to said cross-head, of the rotary anvil-table G, the notched wheel $n\ n'\ n^2$, stud-wheel $p\ p'\ p^2$, shaft *o*, and gearing *o'* between the shafts *o* and crank-shaft *e*, substantially as shown and described.

11. In a machine for clinching bottle-caps, the combination, with an anvil-post or series of posts on which the work is placed, a reciprocating holder reciprocating to and from said posts, and clinching-plungers attached to said holder, of a detaching hook or hooks affixed to said holder in advance of the plungers, adapted to descend upon and engage the clinched cap on the advanced post and to remove the same from said post on the ascent of the holder, substantially as set forth.

12. In a machine such as set forth, the combination, with the anvil-post or series of posts on which the work is placed and a reciprocating holder carrying clinching-plungers, of engaging hook or hooks, such as *w*, also carried by the holder in advance of the plungers to engage and remove the clinched cap, with the laterally-acting ejector-lever *v*, substantially as and for the purpose set forth.

13. In a machine substantially such as set forth, the combination, with the anvil-posts and the reciprocating plunger slide or holder *d*, of the hooks *w*, carried by said slide, the diverging lever *k'*, carried by said slide and engaging the hooks, and a fixed stop, *j*, in the path of said lever, substantially as and for the purpose set forth.

14. In a machine such as set forth, the combination, with the anvil-posts and the reciprocating slide or holder with its clinching plunger or plungers, of the hooks *w*, ejector *v*, and diverging lever *k'*, all carried by the reciprocating holder, with the stop *j*, fixed in the path of said lever, substantially as and for the purpose set forth.

15. In apparatuses for clinching bottle-caps or equivalent work, the combination, with a centrally-arranged clinching-machine, of the annular rotary work table or trough *k*, arranged to revolve around said machine, substantially as shown and described.

16. In apparatuses for clinching bottle-caps

or equivalent work, the combination, with a centrally-arranged clinching-machine, of the annular rotary work-table *k*, surrounding the machine, and a fixed concentric trough surrounding said work-table, substantially as shown and described.

17. In combination with a centrally-arranged machine, the surrounding rotary annular table *k* and fixed concentric troughs *i h*, substantially as and for the purpose set forth.

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