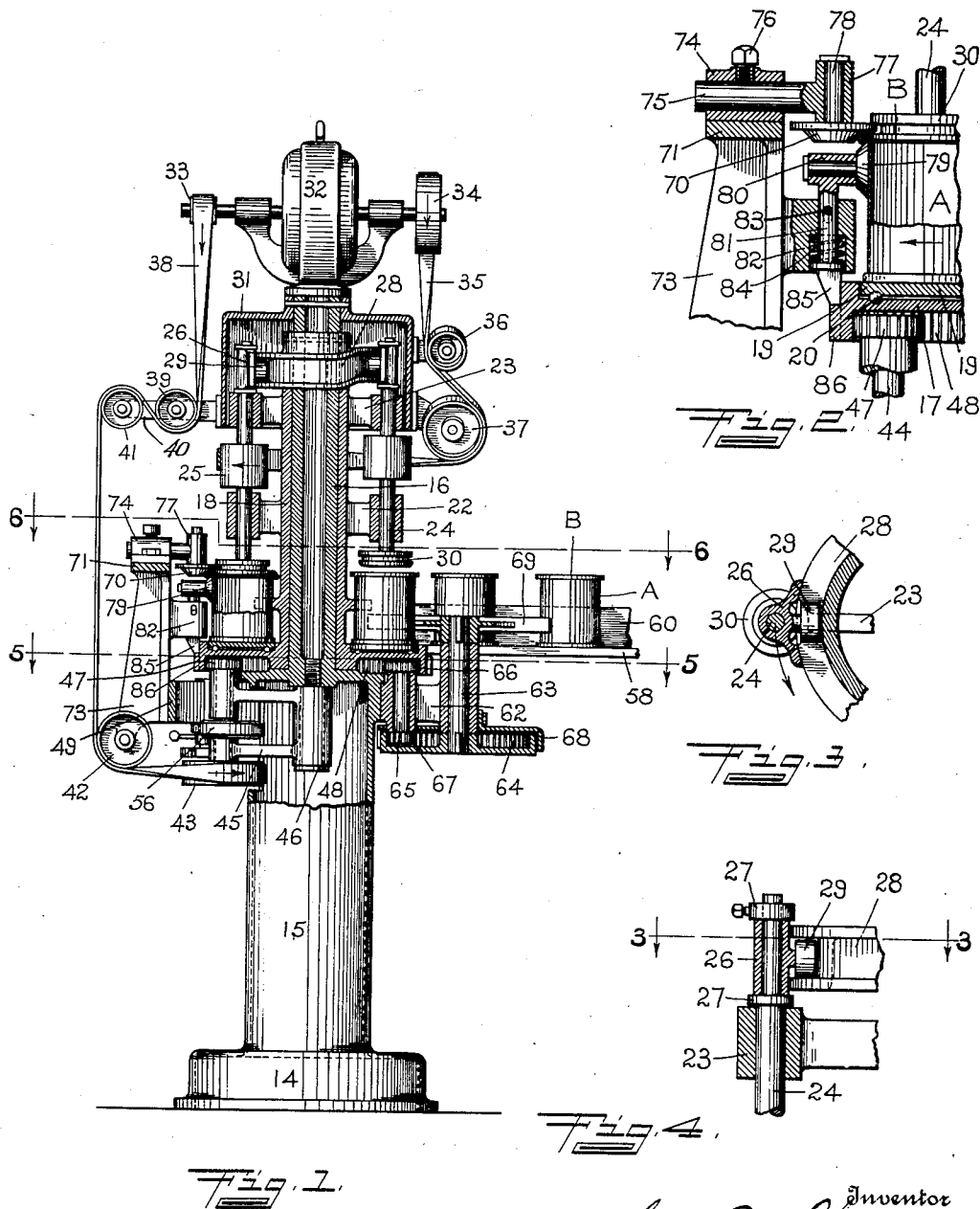


L. C. SHARP.
CAN CLOSING MACHINE.
APPLICATION FILED JULY 3, 1916.

1,389,704.

Patented Sept. 6, 1921.

3 SHEETS—SHEET 1.



Witnesses

J. C. Sharp
Wm. Jamieson

By

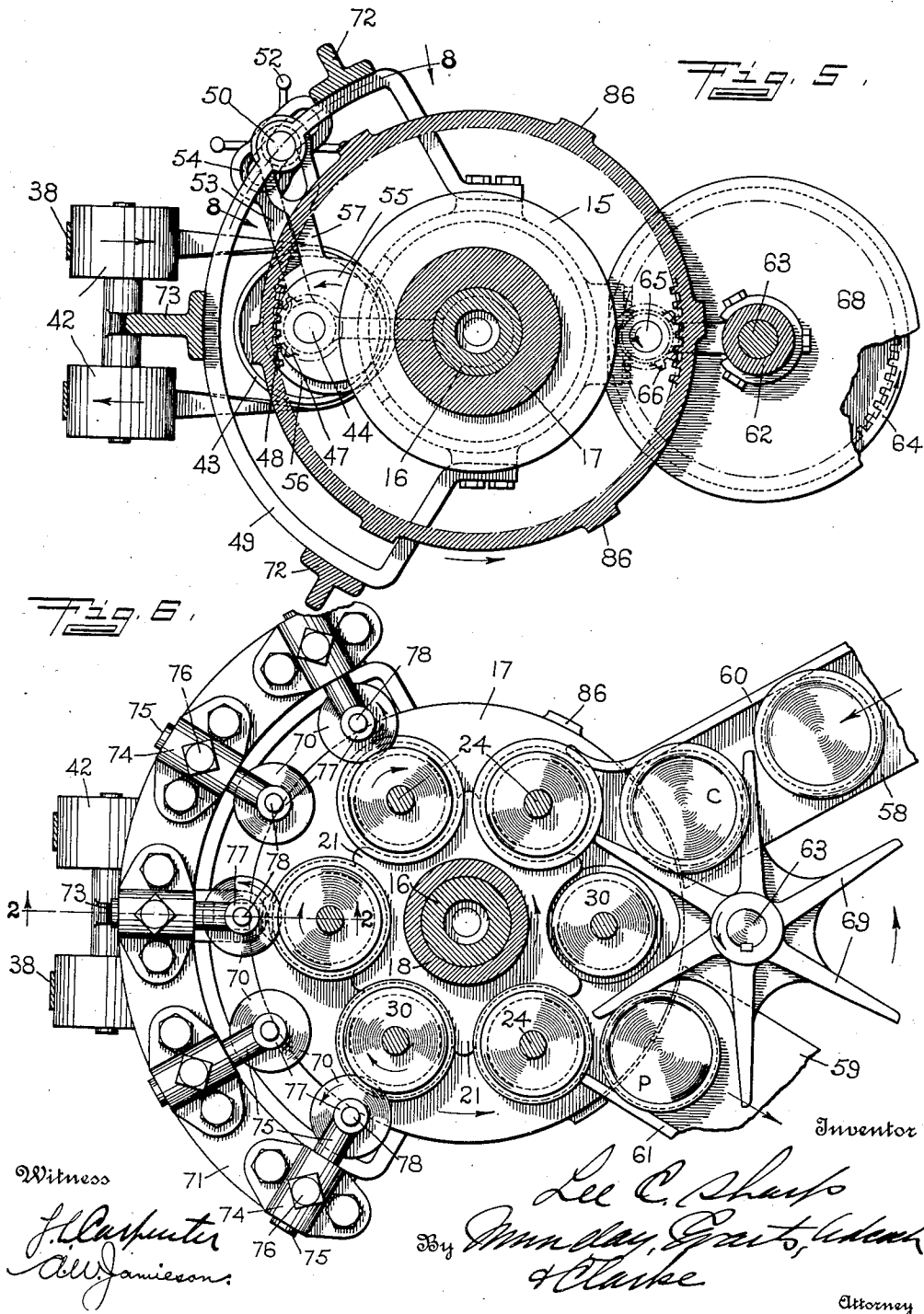
L. C. Sharp Inventor
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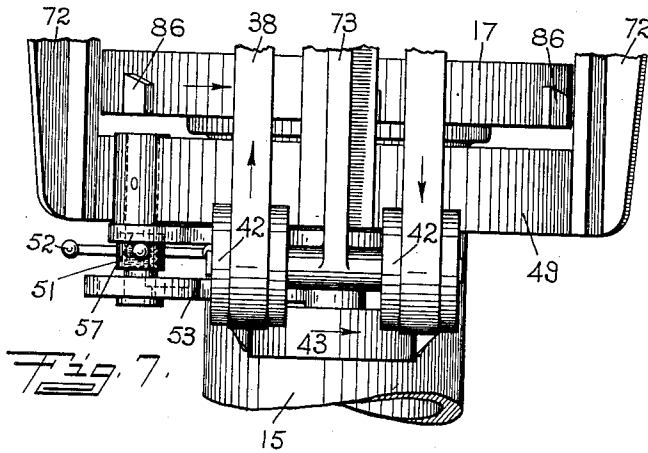
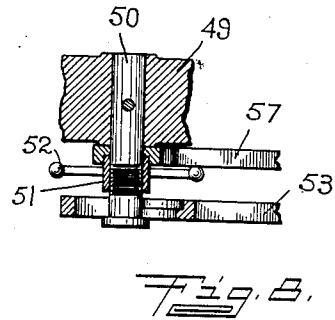
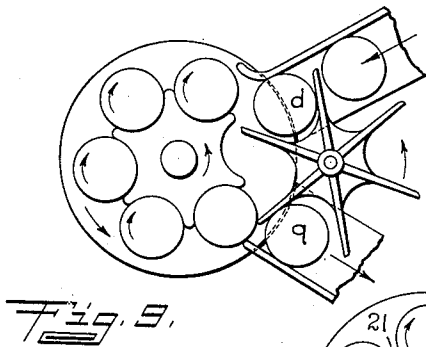
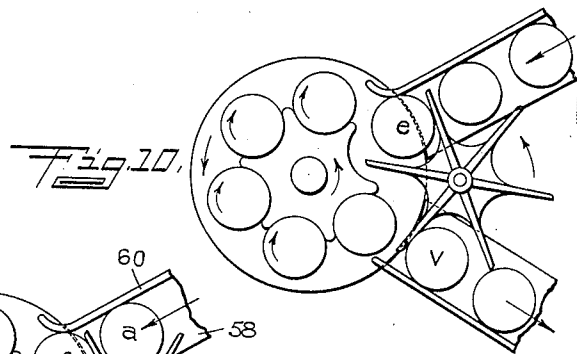
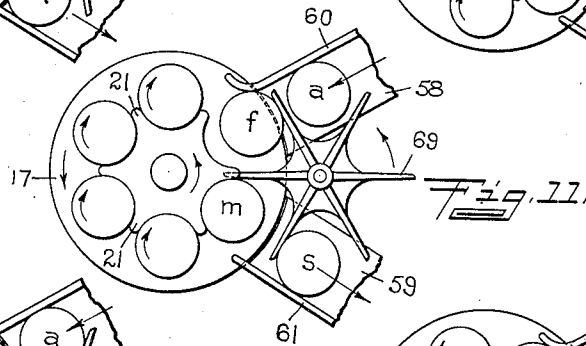
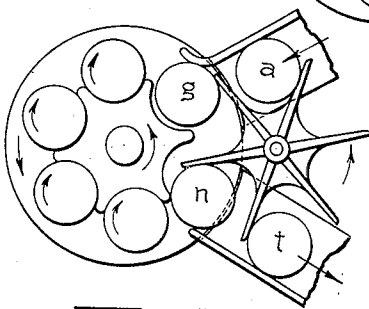
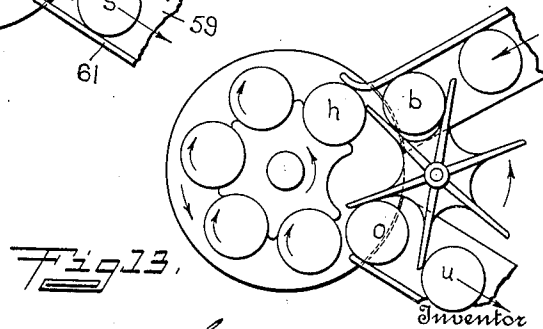


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3 SHEETS—SHEET 3.



Witness
J. H. Carpenter
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UNITED STATES PATENT OFFICE.

LEE C. SHARP, OF PLATTSMOUTH, NEBRASKA, ASSIGNOR TO AMERICAN CAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CAN-CLOSING MACHINE.

1,389,704.

Specification of Letters Patent.

Patented Sept. 6, 1921.

Application filed July 3, 1916. Serial No. 107,219.

To all whom it may concern:

Be it known that I, LEE C. SHARP, a citizen of the United States, residing at Plattsmouth, in the county of Cass and State of Nebraska, have invented certain new and useful Improvements in Can-Closing Machines, of which the following is a specification.

My invention relates to machines for securing the covers on cans, or cylindrical sheet-metal containers, of the kind in which the cover is secured to the can-body by rolling or double-seaming the edges of the cover to the flanged end of the body, and the machine provided by my invention is intended particularly for use in closing or covering cans after the same have been filled. It is the object of my invention to provide a simple, durable and economically operable machine for this purpose, having means for clamping the covers thereon prior to the beginning of the seaming or rolling operation, means for rapidly revolving the cans on their own axes after the clamping of the covers thereon, rotary carrying means for moving the revolving cans either continuously and uniformly or intermittently and variably past seaming-rollers that are mounted on stationary axes, and means for automatically feeding the cans onto and removing them from the rotary carrying means. Subordinate objects of my invention relate to the particular structure and arrangement of the mechanism for performing the enumerated functions, and include the provision of special driving and actuating means for revolving the cans, for actuating the rotary carrying devices, and for operating the feeding and ejecting means in synchronism with the carrying devices. A further object of my invention is to provide in a machine of this kind, seaming-rollers which may be adjusted while the machine is in operation, the said rollers being accessible and rotatable on normally-fixed axes, and to provide a cooperating movable seaming-roller for facilitating the formation of the seam at a certain critical stage of the operation. A further object of my invention is to provide a machine of this kind whereof the general structure and arrangement is such as to enable a large output therefrom while employing a minimum amount of floor-space, and in which the

driving mechanism and movable parts are so arranged as to be in the main self-enclosed and protected, and to afford the greatest safety and protection to the operator.

In the accompanying drawings Figure 1 is a partial side elevation and partially a vertical section of a machine embodying my invention, Fig. 2 is a detail vertical section on the plane of the line 2—2 of Fig. 6, Fig. 3 is a detail horizontal section on the plane of the line 3—3 of Fig. 4, Fig. 4 is a detail vertical section through the head of one of the chuck-spindles, Fig. 5 is a horizontal section on the plane of the line 5—5 of Fig. 1, Fig. 6 is a horizontal section on the plane of the line 6—6 of Fig. 1, Fig. 7 is a detail rear elevation of a portion of the driving mechanism, Fig. 8 is a detail section on the plane of the line 8—8 of Fig. 5, and Figs. 9 to 13, inclusive, are diagrammatic plan views showing successive positions of the can-feeding and ejecting devices.

In the illustrated embodiment of my invention the operating mechanism is mounted on a fixed support consisting of a base or footing 14, a cylindrical vertical column 15 integral with said base, and a smaller tubular column or center-post 16 which is coaxial and integral with the column 15. A horizontal circular table 17 rests upon the upper end of the column 15, said table being integral with a sleeve 18 which fits revolvably upon the center post 16 and extends up from the table to a point near the upper end of said center post. In the upper surface of the circular table 17 there are a plurality of cylindrical recesses or pockets which are spaced equidistantly from each other and at uniform radial distances from the vertical axis, or center of the post 16, about which the table is revoluble. In said pockets circular plates or disks 19 are held revolvably, said disks preferably resting upon anti-friction bearings formed by balls moving in suitable circular races in the lower sides of the plates and the bottoms of the pockets in the table. The upper surfaces of the disks 19 are flush with the surface of the table. On the sleeve 18, slightly above the table, there are radially extending spacing-fingers 21 having between them semi-cylindrical pockets or recesses which

are alined coaxially with the revoluble disks 19 in the table. On the upper portion of the sleeve 18 there are two sets of radial arms 22 and 23, vertically-spaced from each other and having in the outer ends thereof bearings for vertical spindles 24, which are thus held revolubly on axes alined respectively with the several axes of the disks 19 and of the recesses between the spacing-fingers 21.

On the intermediate portions of the spindles 24, between the bearings therefor in the arms 22 and 23, pulleys 25 are secured as shown, said pulleys being engageable by a driving-belt to rotate them during a certain portion of their movement about the axis of the center-post 16, as hereinafter described. The upper portions of the spindles, above the bearings in the arms 23, pass revolubly through head-blocks 26, collars 27 being secured to the spindles above and below said head-blocks as shown in Fig. 4, so that the blocks and spindles are retained in fixed vertical relation to each other. The sides of the head-blocks have laterally extended arcuate portions, shown in Fig. 3, which fit slidably against the flanges of a stationary groove-cam or trackway 28, the latter being secured to the center-post 16 above the end of the revolving sleeve 18. On the inner sides of the head-blocks, rollers 29 are revolubly mounted on axes which extend radially to the center-post, and said rollers fit between the flanges of the trackway 28, so that the spindles are moved vertically by said trackway during the rotation of the sleeve 18 about the center-post. The lower ends of the spindles carry heads or chucks 30 for engaging the covers of the cans to clamp the same onto the can-bodies prior to the seaming operation, said chucks also coöperating with the seaming-rollers during the seaming operation, as will appear hereinafter.

In the operation of the machine the cans A, after being filled, have the covers B, laid loosely thereon and are fed onto the rotating table so as to rest upon the disks 19, being centered thereon by passing into the pockets between the spacing-fingers 21, and being thus positioned beneath the heads or chucks 30 on the corresponding spindles.

To the upper end of the stationary center-post 16 there is secured a hood 31 having depending marginal flange-portions which extend down around the cam-tracks 28 and the upper bearings for the spindles, so as to substantially inclose the same. A convenient means for driving the mechanism is afforded by mounting on top of the hood 31 an electric motor 32 of which the shaft extends horizontally and carries at its opposite ends pulleys 33 and 34, as shown. From the pulley 34 a belt 35 is extended downwardly and passes around idler-pulleys 36 and 37 mounted on suitable brackets that extend out from the side of the hood. The axes of the pulleys 36 and 37 are arranged, in accordance with well-known principles of belting, so that the lower portion of the belt 35 may extend in a horizontal plane around the pulleys 25, engaging the peripheral portions of the same as if they were parts of a larger pulley moving on an axis concentric with the post 16. Those of the pulleys 25, which at any moment are at the side adjacent to the idlers 37 are not engaged by the belt, but as the spindles are carried around by the rotation of the sleeve 18 the pulleys are successively engaged by the belt so that the spindles are driven thereby at high speed.

From the pulley 33 a belt 38 is extended downwardly and around idler-pulleys 39 and 41 carried on a bracket 40 secured to the hood, as shown. From the idlers 41 the belt again extends downwardly and around idlers 42, thence extending in horizontally and around a pulley 43. Said pulley is carried on the lower end of a shaft 44 which is journaled in the outer end of a radius-arm 45, the latter being pivotally mounted on a stub-shaft 46 disposed within the column 15 coaxially with the center-post 16, and the side of the column having a suitable opening therein through which the radius-arm extends. At the upper end of the shaft 44 the same carries a pinion 47 which meshes with an annular or internal gear 48 formed on the inner side of a depending marginal flange on the table 17. When the radius-arm 45 is held in a fixed position, the pinion 47 drives the gear 48, the table, and the sleeve 18 at a uniform rotational speed about the axis of the center-post. Means for so holding the radius-arm are provided as follows: Near the upper end of the column 15 there are secured to the sides thereof the ends of a bracket 49 having an outer curved or arcuate portion extending slightly below and beyond the marginal portion of the table 17. On said bracket there is fixedly secured a stud 50 which extends down vertically therefrom, and upon a threaded portion of the stud there is rotatably disposed a cylindrical nut 51 having a plurality of radial arms 52 by which it may be turned. At the outer portion of the radius-arm 45 there is an arm 53 integral therewith and having a head with a curved slot therein extending concentrically with the stub-shaft on which the radius-arm is mounted. Said slotted head of the arm 53 fits slidably around the stud 50, and at a part of the head coincident with one end of the curved slot there is a cylindrical recess or counterbore 54 into which the lower end of the nut 51 may be moved by screwing the same downwardly upon the stud. When the nut is so engaged in the counterbore 54 the radius-arm is thereby held in fixed position, and the rotary movement of the table 17 is uniform, as before mentioned.

Instead of imparting a uniform rotational movement to the table, however, it is frequently, and in fact usually, desirable that the movement be alternately retarded and accelerated, or fully intermittent, so that the table will be stopped at certain positions, or in passing said positions will be moved very slowly proportionally to the rate of movement thereof between such positions. A convenient means for effecting such variable movement of the table, at the will of the operator, is provided as follows: The bearing in the radius-arm 45, for the shaft 44, is divided and on said shaft between the upper and lower portions of the bearing there is secured an eccentric 55. Said eccentric fits revolvably within an eccentric-strap 56 having a rod or stem 57 which is longitudinally slotted and fits slidably around the stud 50 above the nut 51. At a position coinciding with one end of the slot therein, said rod 57 has a cylindrical counterbore into which the nut 51 may be moved by screwing the same upwardly upon the stud, such movement of the nut simultaneously disengaging it from the arm 53 as will be apparent from Fig. 8. With the nut 51 in the described upper position, the radius-arm is left free to swing about the axis of the stub-shaft 46, and the eccentric-rod 57 is pivotally connected with the stud 50, so that during rotation of the shaft 44 the radius-arm is caused to swing or oscillate about its pivotal axis in accordance with the movements of the eccentric. During such oscillatory movements the shaft 44 continues to be driven at a substantially uniform rate by the belt 38, the idlers 42 being so positioned as to enable the swinging movements to be made without materially altering the tension of the belt or causing it to become disengaged from the pulley 43. Thus during the oscillation or swinging of the radius-arm the pinion 47 remains constantly in mesh with the gear 48 and continues to rotate about its own axis at a uniform rate, but, owing to the swinging movement of the pinion-axis, the pinion is enabled to roll planetarily upon the gear when the swinging movement is in the direction opposite to that in which the gear is being driven, so that movement of the gear is retarded, while during the swinging movement in the other direction the movement of the gear is correspondingly accelerated. By suitably proportioning the eccentric, the throw of which determines the extent of the swinging movement, the retardation of movement of the gear and table 17 may be made such that there will be a momentary pause or stoppage of the movement once during each revolution of the pinion. The diametral ratio of the pinion and gear is made such that the stopping positions, or the positions of greatest retardation of movement of the rotating table 17, will be reached when the disks 19 are successively at like positions with respect to the stationary parts. There are in the illustrated construction, six of the disks and of the corresponding spindles 24, heads 30, and pockets 47 is so proportioned as to make six revolutions to one revolution of the gear and table.

At one side of the machine there is arranged feeding and ejecting mechanism, for automatically placing the cans upon the rotating table preparatory to seaming the covers thereon, and for removing them from the table after the covers have been seamed onto the can-bodies. For the above purpose there are provided two track-plates 58 and 59, of a width slightly greater than the diameter of the can-bodies A, said plates being suitably supported and arranged so that their upper surfaces are flush with the surface of the table, and so that they extend radially of the table, diverging from each other at an angle substantially the same as that between any two adjacent sets of the can-engaging devices that are mounted upon and rotate with the table. At their outer or opposite sides, said track-plates are provided, respectively, with guide-rails 60 and 61, of which the ends project in over the marginal portion of the table, the rail 60 being curved around in the direction of movement of the table, as shown in Fig. 6. On the side of the column 15, at a position intermediate between the adjacent ends of the track-plates 58 and 59, there is secured a bracket 62 having in the outer end thereof a bearing for a vertical shaft 63 which carries at the lower end thereof an annular or internal gear 64. In the inner end of the bracket 62 there is formed a bearing for a shaft 65 which carries at its upper end a pinion 66 which meshes with the gear 48 of the rotating table, and at the lower end of said shaft 65 there is carried a pinion 67 which meshes with the gear 64. A shield or guard-plate 68 is secured to the bracket 62 and extends over and around the edges of the gear 64 so as to substantially inclose the same and the pinion 67. The ratio of the pinion 66 to the gear 48 is the same as the ratio of the pinion 67 to the gear 64, so that by the driving connection provided as described the shaft 63 is caused to rotate at the same speed and in the same direction as the table 17. On the upper end of the shaft 63 there is secured a star-wheel 69 of which the arms are so arranged as to sweep over the adjacent portions of the table and of the track-plates 58 and 59, during rotation of the shaft. The number of arms on the star-wheel is the same as the number of sets of can-engaging devices carried by the rotating table and sleeve 18. The operation of the feeding and ejecting devices may be

clearly understood by reference to Fig. 6 and Figs. 9 to 13, inclusive. The filled cans, with the covers loosely applied thereto, are placed upon the track-plate 58 and are moved inwardly toward the table 17, either by hand or by any suitable conveying means, until said cans are engaged by the arms of the star-wheel and begin to be actuated thereby. The inwardly-moving cans are first engaged by the star-wheel when at about the position of the can shown at *a* in Figs. 11 and 12, resting on the plate 58. Successive positions of the can are indicated at *b* in Fig. 13, at *c* in Fig. 6, at *d* in Fig. 9, at *e* in Fig. 10, at *f* in Fig. 11, at *g* in Fig. 12, and finally at *h* in Fig. 13, where the can is fully seated between the spacing-fingers 21 and centered with the respective devices for clamping and rotating it. The ejection of the cans begins at the position *m* shown in Fig. 11, and from such position the can successively occupies the positions *n*, *o*, *p*, *q*, *r*, *s*, *t*, and *u*, shown respectively in Figs. 12, 13, 6, 9, 10, 11, 12 and 13. From the last named position the can may be removed by hand or by any suitable conveying means, or it may be left to be pushed farther along the track-plate 59 by the other cans that follow it. By tracing the course of the cans through the successive positions above designated, it will be seen that the movements thereof are a resultant of two principal factors, namely, the rotation of the star-wheel, and the rotation of the table and the spacing-fingers 21. It will be seen, however, that the movements of the cans are also slightly influenced by two stationary guiding members, formed by the inner end portions of the rails 60 and 61, the first serving to prevent the cans being pushed outwardly from the center of the rotating table, and the second serving to prevent the cans sliding out of reach of the star-wheel arms while being pushed onto the receiving track-plate 59. The rail 60 likewise prevents the cans being pushed sidewise off the plate 58 when first engaged by the star-wheel arms.

The cam-track 28 is so proportioned and arranged that the spindles 24 and heads or chucks 30 will be raised while passing around the side of the machine adjacent to the feeding and ejecting devices, and so that said chucks 30 will be moved down to clamp the covers onto the cans just after the same have been centered beneath the chucks, as at the position *h* in Fig. 13. Just after the clamping of the cover onto the can by the downward movement of the respective spindle, the pulley 25 carried by said spindle is engaged by the driving-belt 35, so that the spindle and the can clamped between the chuck and table-disk 17 are set into rapid rotation, such motion being continued until the spindle has moved around almost to the can-releasing position adjacent to the

inner end of the receiving track-plate 59. During the described rotation of the can, and while the devices holding the same are moving through the intermediate part of their path between the receiving and ejecting positions, the rotating can is moved past a plurality of seaming-rollers 70 which engage and roll the edge of the cover to double-seam the same onto the flanged end of the can-body. For supporting said seaming-rollers, there is provided a horizontal arcuate plate 71 which is connected with the bracket 49 by standards 72 and 73, as shown in Figs. 1, 5 and 6. The standard 73 has a downwardly extended portion which is used for supporting the idler-pulleys 42. On the upper side of the plate 71 a plurality of clamp-blocks 74 are fixedly secured, said blocks each having a cylindrical opening therein extending radially of the center-post 16. In said openings of the clamp-blocks 74, stems 75 are adjustably held by means of set-screws 76, and on the inner ends of the stems are head 77 in which are journaled the stems 78 of the rollers 70. Said rollers are thus held revolubly in positions such that their peripheral portions may engage the can-covers as the rotating cans are carried past the rollers by the movement of the table. The required forms of the several rollers and the detailed operations thereof in rolling the seam are well known in the art and need not be described herein. It may be noted, however, that the rollers are held on fixed axes, being movable by adjusting the positions of the stems 75 in the clamp-blocks 74, only for the purpose of compensating wear or to secure a proper working relation of each roller to the cans.

Besides the rollers 70, which revolve on axes parallel with the axes of the cans, it is desirable at a certain stage of formation of the seam to employ a roller 79 which is revoluble on an axis radial to the table, and which is movable vertically, or axially of the can. Such a roller is shown as having the stem thereof journaled in the head 80 of a stem 81 which is movable vertically through a guide 82 formed integrally with the standard 73. Movement of said stem 81 is limited by a transverse pin 83 which extends into a slot in the guide, and a spring 84, arranged in a recess in the guide as shown in Fig. 2, presses the stem downwardly. At the lower end of the stem is a foot-piece 85 which is engageable by cam-lugs 86 on the edge of the rotating table 17, to raise the stem and move the roller 79 into operative position at the proper intervals.

From the foregoing the operation of the machine as a whole will be readily apparent. It may be noted that a sufficient number of the seaming rollers 70 may be provided to so sub-divide the seaming operation as to en-

able the same to be performed with the supporting-table 17 moving continuously and uniformly, the seaming of the rapidly rotating cans being effected while the same are passing the seaming-rollers. It is usually preferable, however, to employ the variable-speed driving devices for the table, so that the movement thereof will be retarded, or momentarily stopped, at successive positions such that the cans will be positioned opposite certain of the seaming-rollers, as shown in Fig. 6, thus enabling a longer relative period of engagement between the cans and seaming-rollers, while the average speed of the table, or the number of revolutions thereof made in a given period of time, remains the same as if its movement were uniform and continuous.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a can-closing machine, a horizontal table rotatable about a vertical axis, a plurality of rotatable and vertically movable spindles spaced equally about the axis of the table, and mounted in bearings fixedly connected with the table, chucks disposed terminally upon the spindles; means for moving the spindles toward and away from the table to clamp cans and covers between the same and the chucks during a part of the movement about the table-axis, means for rotating the spindles during the clamping of the cans and covers, from which rotating means said spindles are periodically disconnected, and seaming-rollers mounted on fixed axes adjacent to the path of the cans and covers so as to be engaged thereby while the covers are clamped on the cans.

2. In a can closing machine, the combination of a rotary can carrying table, individual rotatable means on said table, for supporting a series of cans, relatively fixed can seaming devices arranged to be engaged by the flanges of the cans and can ends as the latter are presented by the rotation of said table, can rotating spindles having chucks depending above the cans and adapted to engage the ends thereof, means for moving said spindles vertically, and means for rotating said spindles with which the spindles are connected and are disconnected by the rotation of the table, the spindles being connected to be rotated only when the flanges of the cans are presented to the seaming devices.

3. In a machine of the class described, a series of rotary and axially movable spindles spaced equally about a common axis and mounted in bearings movable about said axis, pulleys mounted on said spindles, a driving belt passing about said axis and engaging the pulleys carried by all the spindles except those at one side of the common axis, the pulleys being vertically

movable within said belt, and means for moving the spindle-bearings to engage the pulleys successively with said driving belt.

4. In a can closing machine, the combination of a series of spindles mounted to revolve on a common axis, means for imparting reciprocation to said spindles during a portion of said revolution so as to lift the spindles, a belt engaging said spindles during a portion of the remainder of the travel of said spindles to produce rotation of them about their individual axes, a can carrier table below said spindles having individual rotary means for supporting the cans, said table being revoluble with said series of spindles, and adjustable means for imparting to said table and spindles a movement of constant speed or a movement of variable speeds.

5. In a machine of the class described, a rotary table adapted to carry rotating filled can bodies, seaming devices located above said table and in position to seam said cans, actuating means for rotating the table to present the cans to said seaming device and means for gradually and without abrupt stoppage retarding and accelerating the movement of the table whereby it is given a variable movement to cause a dwelling of the cans at successive positions adjacent the several seaming devices.

6. In a machine of the class described, a rotary table, chuck-disks revolubly mounted therein, chucks alined axially with said disks and movable to clamp cans and their covers between the same and the disks, means for actuating the chucks to rotate the clamped cans and covers, a series of relatively fixed seaming devices arranged peripherally of the table, actuating means for rotating the table to carry the cans past the seaming devices, and means for gradually and without abrupt stoppage retarding and accelerating the movement of the table whereby it is given a variable movement to cause a dwelling of the cans at successive positions adjoining the several seaming devices, said retarding and accelerating means being adjustable to give the cans an alternately fast and slow movement.

7. In a machine of the class described, a horizontal rotary table adapted to receive the filled can bodies, seaming devices located above said table and in position to seam the cans as they are presented thereto, rotating means for positioning the cans accurately upon said table and for removing them therefrom, actuating means for rotating said table and said means and a variable speed control for said actuating means, said control causing gradually accelerated and retarded movement of the table to prolong the action of said seaming device and producing also corresponding acceleration and retardation of the means feeding the cans

on to the table and removing them therefrom.

8. In a machine of the class described, a horizontal rotary table adapted to receive the filled can bodies, seaming devices located above said table and in position to seam the cans as they are presented thereto, rotating means for positioning the cans accurately upon said table and for removing them therefrom, actuating means for rotating said table and said means and a variable speed control for actuating said means, said control causing gradually accelerated and retarded movement of the table to prolong the action of said seaming device and producing also corresponding acceleration and retardation of the means feeding the cans on to the table and removing them therefrom, said speed control being adjustable.
9. In a machine of the class described, a horizontal rotary table adapted to receive the filled can bodies, seaming devices located above said table and in position to seam the cans as they are presented thereto, rotating means for positioning the cans accurately upon said table and for removing them therefrom, actuating means for rotating said table and said means and a variable speed control for said actuating means, said control causing gradually accelerated and retarded movement of the table to prolong the action of said seaming device and pro-

ducing also corresponding acceleration and retardation of the means feeding the cans on to the table and removing them therefrom, said speed control being adjustable from a continuous movement to an accelerating and retarding one.

10. In a machine of the class described, a rotating table, seaming rolls mounted thereabout, rotatable means for engaging the can ends to produce rotation of the cans about their own axes, said can rotating means being independent of the table and producing rotation of the seaming rolls as the cans are engaged thereby, and means for continuously rotating said table with gradually variable speeds relative to said seaming rolls.

11. In a machine of the class described, the combination of a rotating table, devices on said table for holding filled cans in predetermined positions, seaming rolls mounted about the travel of said table, one of said rolls being adapted to engage without and above the seam and another to be lifted from beneath and under the seam, said table having means for lifting said last mentioned roll.

Signed in the presence of two subscribing witnesses.

LEE C. SHARP.

Witnesses:

B. A. ROSENCRANS,
FRANK J. LIBERSHAL.