No. 737,567. PATENTED SEPT. 1 1903.

O. S. BEYER.

DOUBLE SEAMING MACHINE.

APPLICATION FILED DEC. 6, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

FIG. 1.

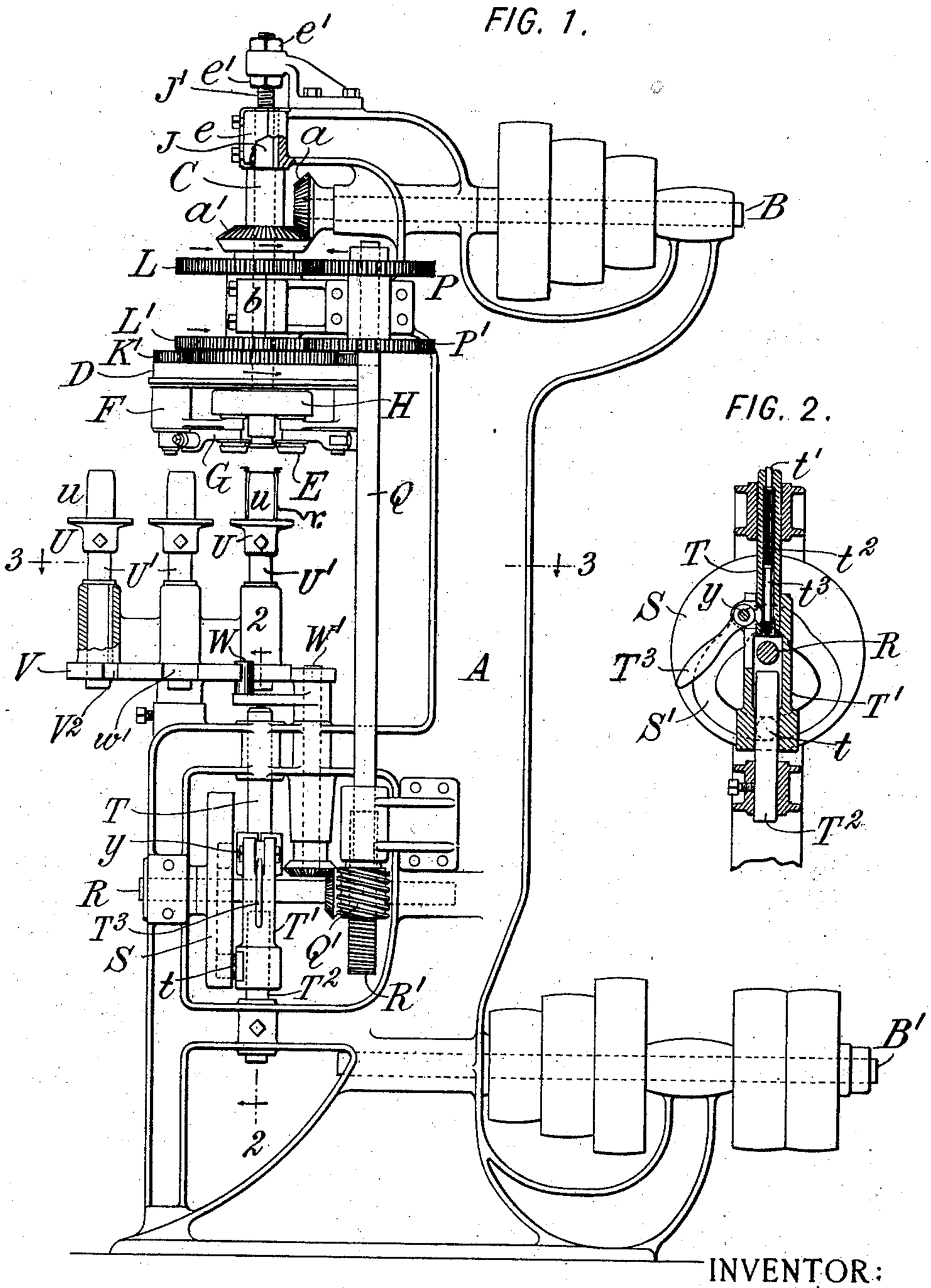

FIG. 2.

INVENTOR:

Otto S. Beyer,

By Attorneys,

Arthur G. Fraser & Co.

WITNESSES:

René Bruine

Fred White

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NO MODEL. 4 SHEETS—SHEET 2.

FIG. 6.

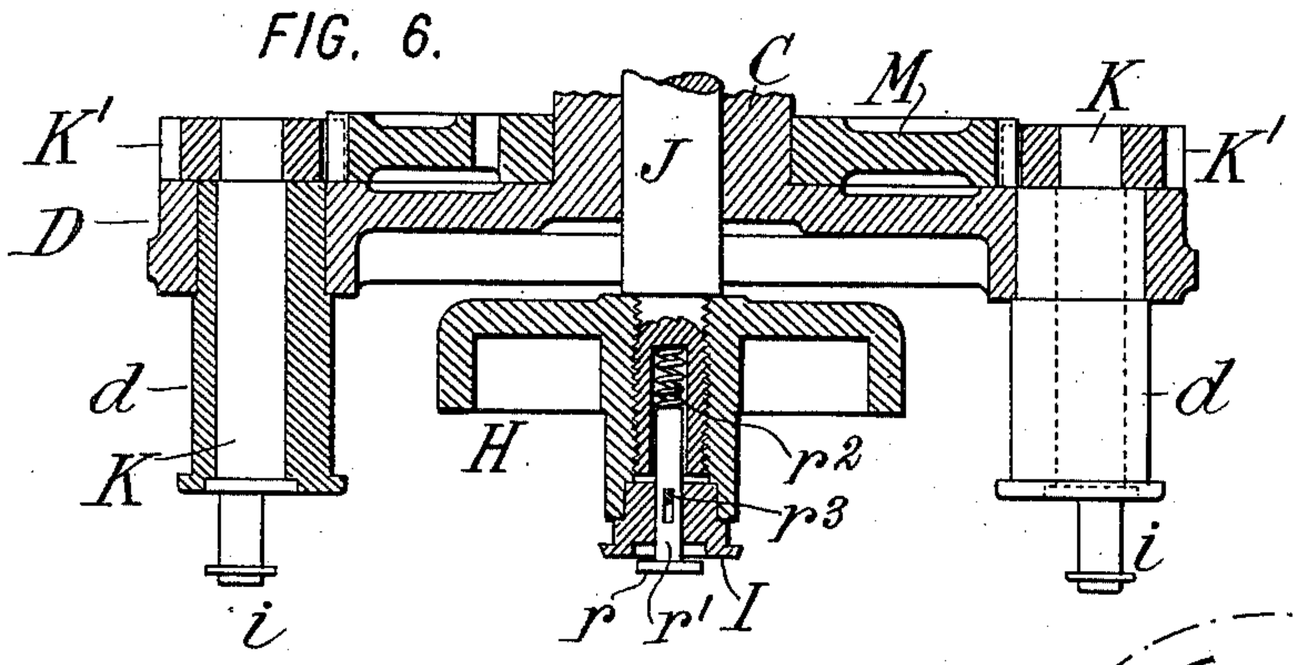


FIG. 7.

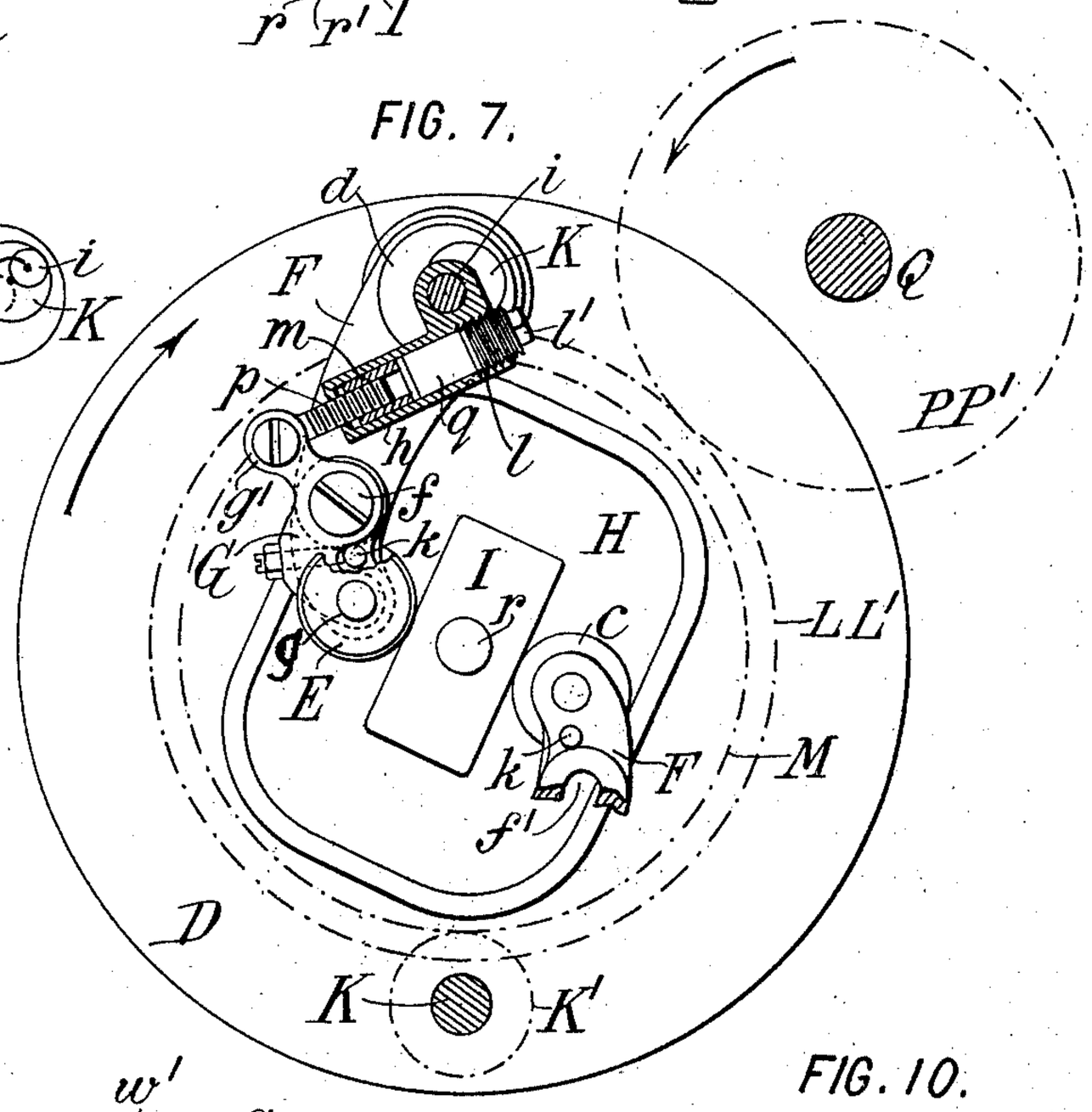


FIG. 8.

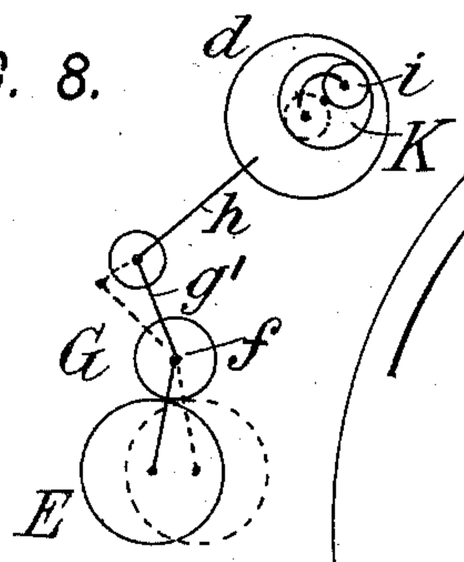
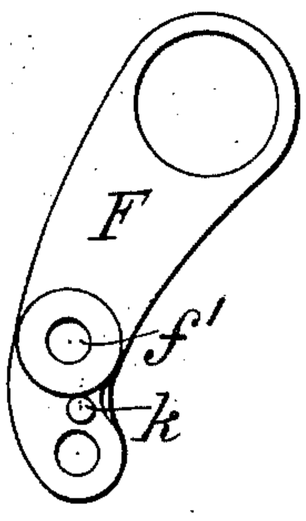


FIG. 9.



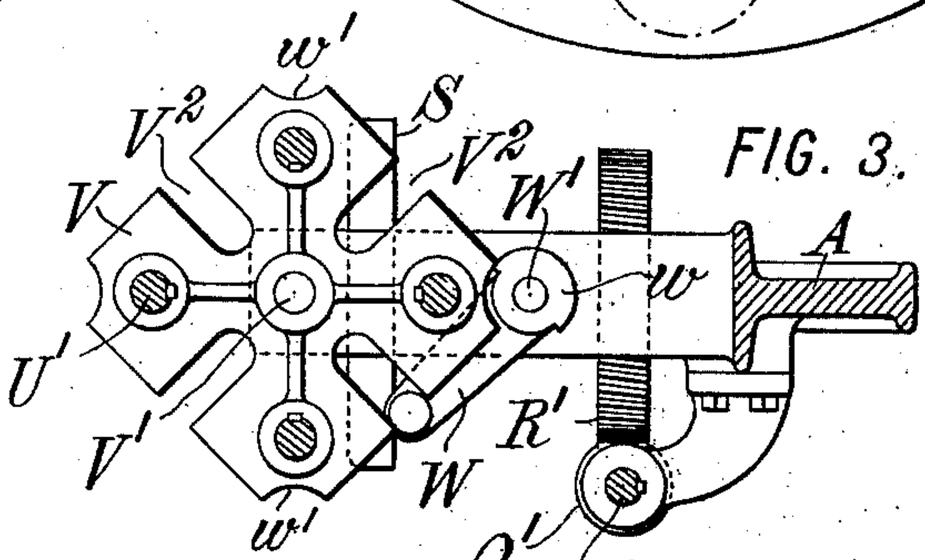
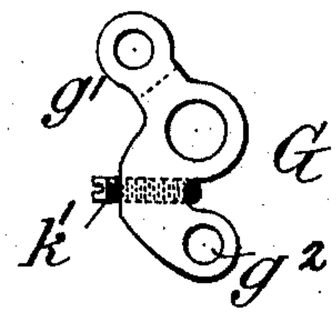


FIG. 3.

FIG. 10.



WITNESSES:
Rene Bruine
Fred Whitty

INVENTOR:
Otto S. Beyer,
By Attorneys,
Arthur G. Draper & Co.

No. 737,567. PATENTED SEPT. 1, 1903.

O. S. BEYER.

DOUBLE SEAMING MACHINE.

APPLICATION FILED DEC. 6, 1901.

NO MODEL. 4 SHEETS—SHEET 3.

FIG. 4.

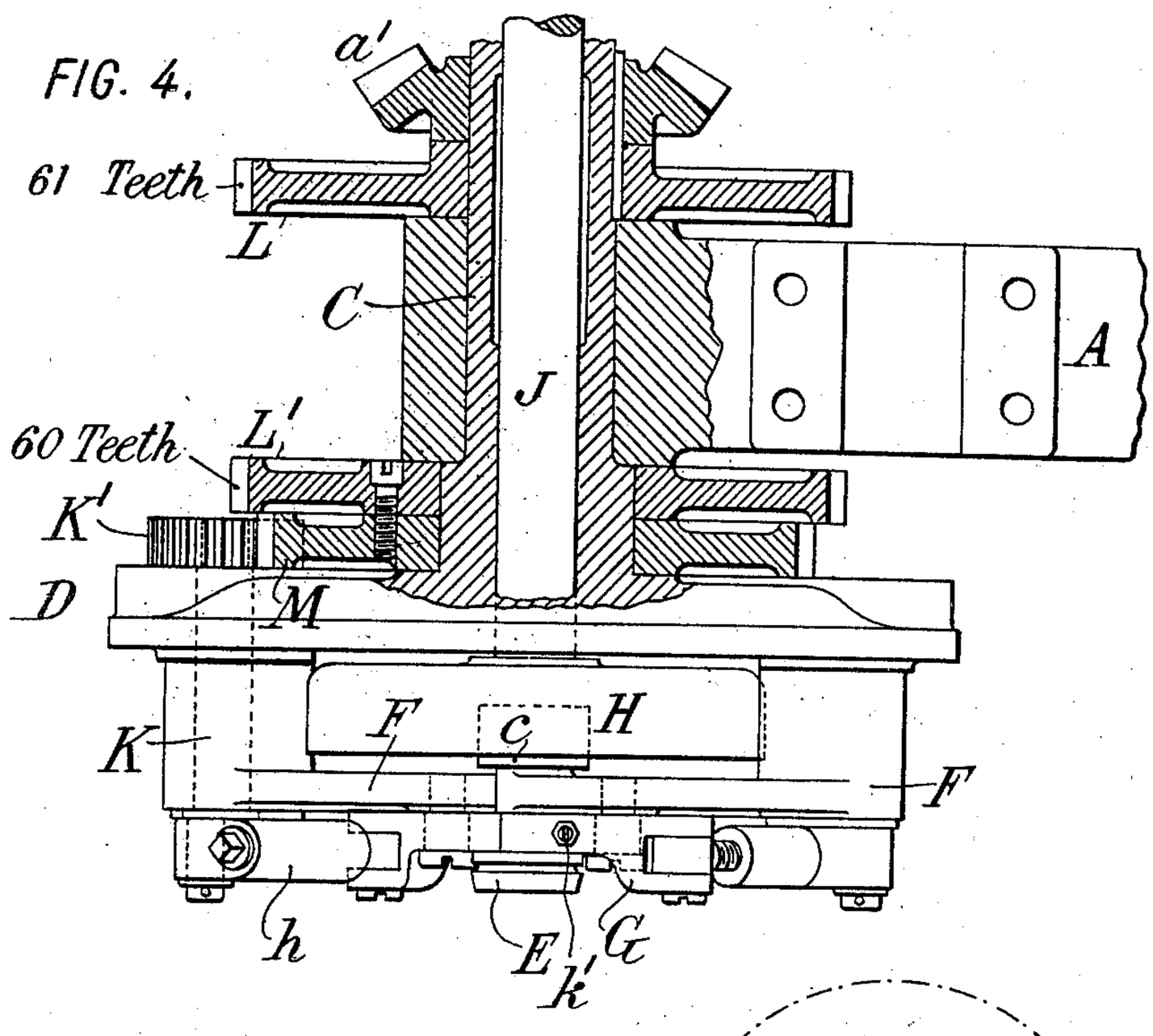
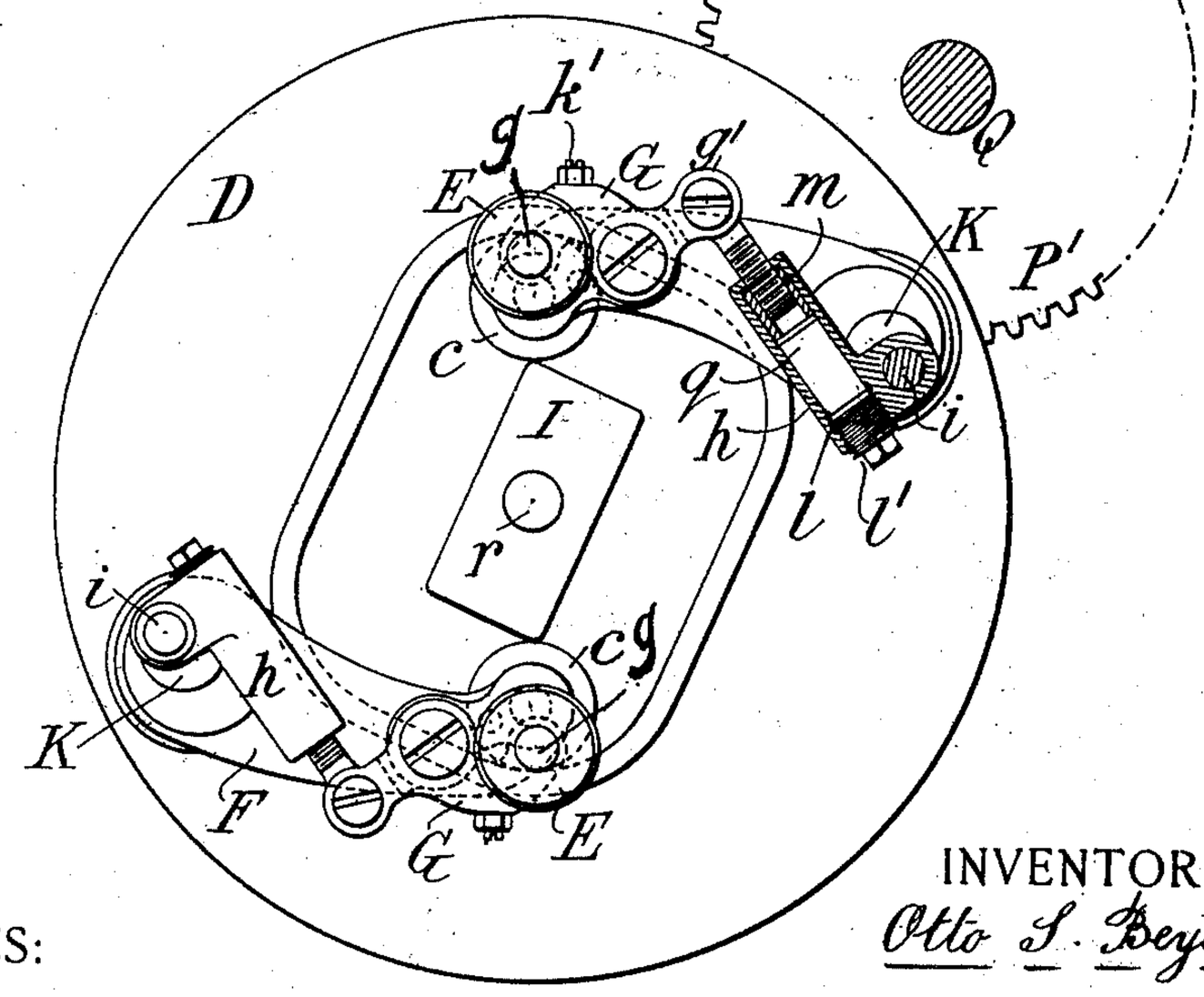


FIG. 5.



WITNESSES:
René Bruine
Fred White

INVENTOR:
Otto S. Beyer,

By Attorneys,
Arthur C. Fraser & Co.

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O. S. BEYER.

DOUBLE SEAMING MACHINE.

APPLICATION FILED DEC. 6, 1901.

NO MODEL. 4 SHEETS—SHEET 4.

FIG. 11.

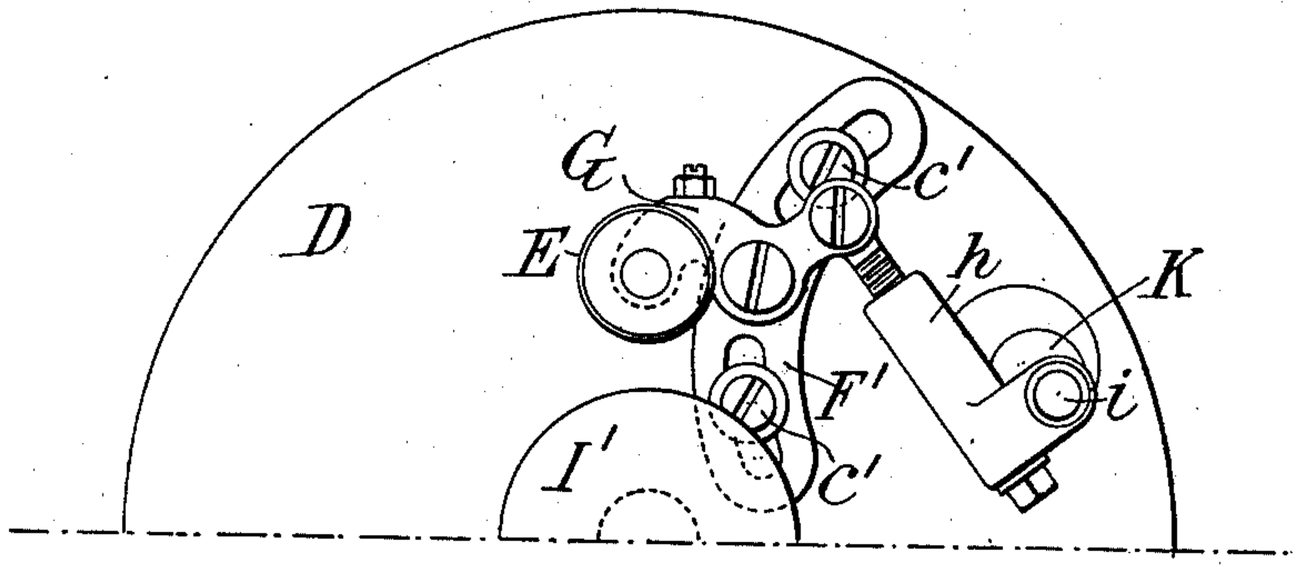
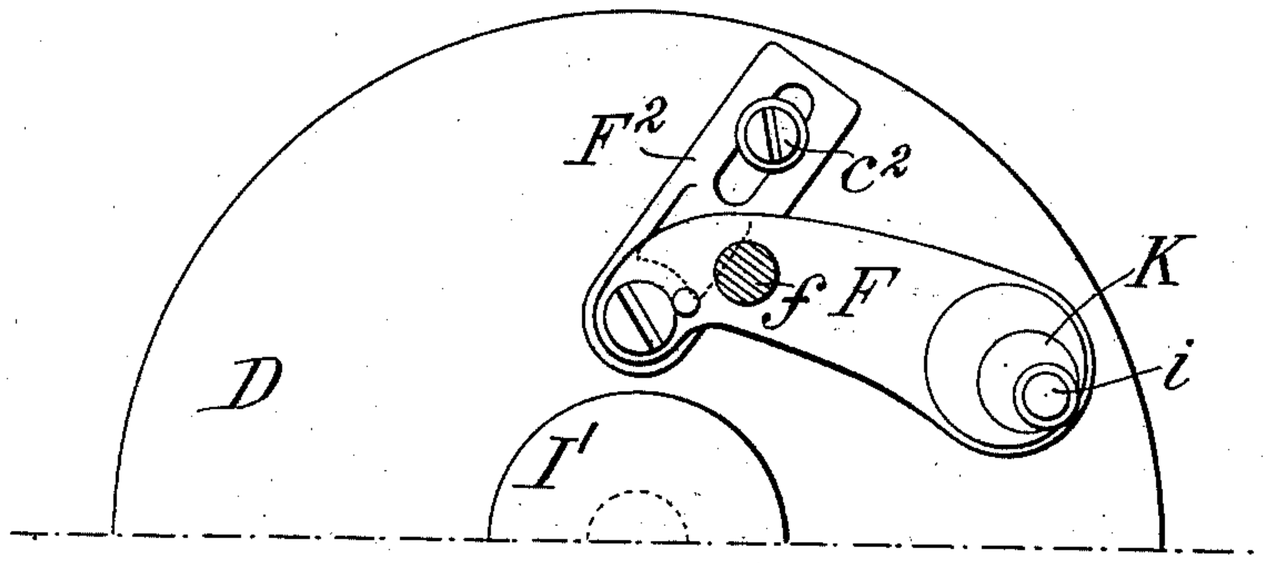


FIG. 12.



WITNESSES:
René Bruine
Fred White

INVENTOR:
Otto S. Beyer,

By Attorneys,
Arthur C. Fraser & Co.

No. 737,567. Patented September 1, 1903.

UNITED STATES PATENT OFFICE.

OTTO S. BEYER, OF CARLSTADT, NEW JERSEY, ASSIGNOR TO E. W. BLISS COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF WEST VIRGINIA.

DOUBLE-SEAMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 737,567, dated September 1, 1903.

Application filed December 6, 1901. Serial No. 84,903. (No model.)

To all whom it may concern:

Be it known that I, OTTO S. BEYER, a citizen of the United States, residing at Carlstadt, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Double-Seaming Machines, of which the following is a specification.

This invention relates to machines for seaming or preferably double-seaming the margins of articles or vessels of sheet metal, such as boxes or cans, being especially designed for the seaming of such vessels or articles as are of irregular form or non-circular, although capable of being modified for acting upon circular objects. In its entirety the invention includes means for feeding the articles to be seamed to the seaming-tools, although the feed mechanism may be omitted in case a hand-fed machine is preferred.

For seaming irregular-shaped non-circular articles two types of machines are known—first, where the former or chuck and the work revolve and the relatively stationary seamers or rolls are caused to act upon the seam, being given a movement toward and from the center or axis in order that they may follow the irregularities of contour or outline of the seam; second, those in which the former or chuck and the work remain stationary and are acted upon by seamers or rolls which revolve around them, being caused to travel in an orbit parallel with the outline of the seam to be formed. My invention in its preferred embodiment is of the latter class or type.

One object of my invention is to provide means for causing the seaming rolls or dies to gradually approach the work, so that in moving inward they first traverse a clearance-space around the seam to be formed and then by their continued movement gradually turn the seam and finally roll it down close or flat against the work, for which latter purpose they follow the outline of the work or remain at their innermost position during more than one complete revolution and preferably two or three revolutions, after which they recede from the work to free the latter and permit it to be removed from the chuck or former. My invention accomplishes this result by positively-acting mechanism operating at repeated intervals, corresponding to the intervals at which the articles to be seamed are operated upon. Thus in the preferred construction the seaming-rolls have a movement which is compounded of two distinct motions—namely, first, a revolving motion around the stationary work in an orbit parallel with the outline of the seam to be formed, and, second, an inward and outward movement which is relatively slow and whereby the said orbit is gradually contracted to form the seam and expanded to free the work. The former of these movements is obtained by means of a cam-groove in which travels a roller, which imparts to a carrier the requisite ontward and inward movements during each revolution to enable it to follow the contour of the article to be seamed. I will designate this carrier as the "contour-carrier." The second of these movements is accomplished through suitable gearing whereby during a prescribed cycle of revolutions—for example, fifteen in the machine which will be described—the seaming-rolls are caused to gradually approach and recede from the work, these approaching and receding movements being imparted to a second carrier, which I will distinguish as the "seaming-crrier," since it is the movement of this latter carrier which determines the seaming operation of the seaming-roll. As the seaming-roll or seamer must partake of the movements of both carriers, it is connected to or carried by both, preferably by being mounted on one, which in turn is mounted on the other. I prefer to mount the seamer on the seaming-carrier and to mount the latter on the contour-carrier; but this arrangement may be reversed.

The general nature of my invention being now understood, I will proceed to describe one embodiment thereof, which I have shown in detail in the accompanying drawings, wherein—

Figure 1 is a side elevation of the machine on a reduced scale. Fig. 2 is a fragmentary vertical section on the line 2 2 in Fig. 1. Fig. 3 is a horizontal section on the line 3 3 of Fig. 1 on the same scale. The remaining figures illustrate the invention more in detail and are drawn to a larger scale. Fig. 4 is a

sectional elevation of the upper part of the mechanism, showing the seaming-roll carriers and their driving mechanism, the sectional parts being cut in a vertical axial plane. Fig. 5 is an under side view or inverted plan of Fig. 4, partly in section. Fig. 6 is a vertical diametrical section of certain parts shown in Fig. 4, the seaming-rolls and their carriers being omitted. Fig. 7 is an under side view similar to Fig. 5, but showing the parts in a different position and indicating the pitch-lines of the gearing. Fig. 8 is a diagram showing certain of the parts appearing in Fig. 7. Figs. 9 and 10 are inverted plans, respectively, of the contour-carrier and seaming-carrier. Figs. 11 and 12 are views answering to Fig. 5 and showing two modified constructions, the carrier G and its actuating mechanism being removed in Fig. 12.

I will now proceed to describe in detail the machine shown in the drawings.

A frame A of any suitable construction is provided to properly support the several active parts to be described. Power is suitably applied to a driving-shaft B—as, for example, by belting from a counter-shaft B'. The driving-shaft, through suitable bevel-gears *a a'*, drives a shaft C, turning in bearings *b* in an arm of the frame A and carrying at its lower end a head or disk D. This revolving head D carries the contour-carrier and seaming-carrier, before referred to, which in turn carry the seaming-tool or seamer. The form of seaming-tool I prefer is a seaming roll or roller suitably grooved, as is well understood, and I prefer to employ two such rolls engaging opposite sides of the work, although one, two, or more seamers may be provided, as may be desired. The drawings show the machine as provided with two seamers, (lettered E E.) The contour-carriers are lettered F, and the seaming-carriers are lettered G.

The contour-carriers F are mounted upon the head D in any manner whereby they shall be rotated with the head, while at the same time they shall be free to move outwardly and inwardly under the control of a cam or other suitable mechanism in order to follow the non-circular shape of the article to be seamed. To this end they may be variously mounted; but I prefer as the simplest construction that each of these carriers be formed as an arm pivoted at one end to the head D and carrying at its other end or at any other convenient location a cam roller or bowl *c*, engaged by any suitable cam. In the construction shown the cam H is stationary and has a groove which receives the roller *c* and which follows the contour of the seam to be formed. The head D has downwardly-projecting tubular studs *d d*, Fig. 6, fixed to it, which form the pivots on which the carrier-arms F are hung. As the head D revolves in the direction, for example, of the arrow in Fig. 7 the carrier-arms F are dragged around with it, so that their rollers *c* are forced to traverse the groove in the cam H, whereby the free ends of the arms which carry these rollers are caused to swing outward or inward to conform to the contour of the article to be seamed.

The seam is formed against a former or chuck I, which has the exact contour of the article to be seamed, so as to enter within the same. In Figs. 5 and 7 it is shown as oblong and rectangular in order to serve for a box or can of that shape. It is stationary and is supported in fixed relation to the cam H, and the shape of the cam-groove in the latter is shown as exactly conforming to that of the chuck I. These stationary parts H and I may be supported in any suitable manner, being shown as fixed on the lower end of a stationary shaft or rod J, which passes up through the tubular shaft C and is fastened non-rotatively at its upper portion to the main frame at *e*, having a screw-threaded portion J', by which it may be adjusted vertically by nuts *e' e'*, Fig. 1.

The seaming-carriers G, one of which is shown separately in Fig. 10, are mounted upon the contour-carriers F, so as to partake of their contour movements while being movable independently thereof to impart the gradual inward and outward movements to the seamers. Accordingly each seaming-carrier G is shown as an elbow-lever pivoted by a screw or stud *f* (entering a hole *f'*, Fig. 9) to the contour-carrier F and carrying on one arm a stud *g*, (entering a hole g^2, Fig. 10,) on which the seaming-roll E is pivoted, while the other arm *g'* is acted upon by the mechanism which gives the seaming-carrier its gradual inward and outward movements. Thus the seaming-roll E, being carried on the carrier G, which in turn is carried on the carrier F, is caused to partake of the movement of both carriers.

For giving the gradual inward and outward movements to the carrier G, I have devised the following-described mechanism: The arm *g'* is connected by a link or connecting-rod *h* to a crank, eccentric, cam, or other device on a rotary spindle K, which passes through the stud *d* and is driven at suitable speed by certain differential gearing. I prefer to form the shaft K with a crank *i*, Fig. 6, at its lower end, which engages the link *h* and through the latter imparts to each revolution of the crank a back-and-forth rocking movement to the carrier G. The crank *i* rotates very slowly relatively to the head D—for example, once to each fifteen turns of the head—so that the inward-and-outward movement thus imparted to the seamer is correspondingly slow. The seamer is shown in Fig. 5 in its extreme position of retraction and in Fig. 7 in its position of closest approach to the work. The two extreme positions are indicated in the diagram Fig. 8, the former position being shown in full lines and the latter in dotted

lines. The slow rotation of the shaft K is imparted by gearing, the preferred form of which I will now describe.

On the shaft C is fixed a gear L, while loose on the same shaft is mounted a gear L′, to which in turn is fastened a gear M. The gear L drives the gear L′ through intermediate gears P P′, Fig. 1, both fixed on the same shaft Q. The gears L P and L′ P′ are respectively differential gears, whereby the gear L′ shall be caused to turn slightly faster or slower than the gear L, so that the gear M in turn shall revolve backward or forward relatively to the head D and by meshing with pinions K′ on the shafts K give to these shafts the requisite slow rotation. With the proportions shown the gears P P′ have each the same number of teeth, while the gears L L′ have respectively sixty-one and sixty teeth, so that to each revolution of the gear L the gear L′ is turned one revolution plus one-sixtieth. Hence in fifteen revolutions the gear L′ will have gone fifteen-sixtieths or one-quarter turn beyond the head D. The gear M, which turns with the gear L′, has four times as many teeth as the pinions K′, so that with each quarter-turn of the gears L′ M the pinions K′ are caused to turn one complete revolution. Hence for each fifteen turns of the head D the cranks *i* will turn one complete revolution, thereby swinging the seamer-carriers G slowly inward and outward through one complete cycle of movements. Of course these proportions may be varied as may be desired.

In the construction shown the roller *c* and seaming-roll E are of like size, and in the innermost position of the seaming-roll their centers coincide, as shown in Fig. 7. With these proportions the inner margin of the cam-groove follows exactly the contour of the seam to be formed, whereby the conforming of the cam is facilitated. It is obviously desirable that when the parts are in this position—that is, while the seamer is doing its final work of flattening the seam—the carrier G shall be uninfluenced by the outward and inward movements of the contour-carrier, so that the seaming-roll shall be to all intents and purposes as though it were carried directly upon the axis of the cam-roller *c*. This result I attain by arranging the shaft K so that its crank *i* comes at this instant concentric with the stud *d*, around which the carrier F is swinging. To this end the stud *d* is bored out eccentrically, being thrown out of center an amount exactly equal to the radius of the crank, as indicated in Fig. 8, where in the position of the crank shown in dotted lines its center has come into coincidence with the center of the stud *d*. It results from this arrangement that in this position the swinging movement of the carrier F swings the carrier G and its arm *g′* around in the arc of a circle concentric with the center of the crank *i*, so that the carrier G receives no angular movement relatively to the carrier F.

It is desirable to prolong the innermost position of the seamer relatively to the seam beyond that which would ensue from its operation by the crank *i* in order that it may finally roll down or flatten the seam for the entire circumference or perimeter of the article on which the seam is formed and preferably somewhat in excess of this in order that the seam may be finally rolled two or three times, for which purpose the inward position shall be prolonged during two or three revolutions of the head D. Obviously this result could not be attained by the merely pendulous movement imparted by the crank, and to accomplish it I so proportion the parts that the crank tends to carry the seaming-roll inward beyond the position shown in Fig. 7, and I provide a stop to arrest it at this position before the crank passes its dead-center, and I provide a yielding connection whereby the crank may pass its dead-center by compressing a yielding part of this connection. The effect of this arrangement is the same as though the path or orbit traversed by the crank-center instead of being a true circle were in the form of a circle which at one side is flattened by a chord. In the construction shown the stop is formed of a pin *k*, Fig. 9, against which a part of the lever G abuts. To render this stop adjustable, the lever G is provided with a screw *k′*, Fig. 10. These parts are shown in abutment in Fig. 7. The screw should be adjusted to exactly that position where the centers of the seaming-roll E and cam-roller *c* are in coincidence, although if these are not of exactly the same size, or the cam is not exactly conformed to the size of the article to be seamed, a slight compensation for these inaccuracies may be provided by a different adjustment of the screw, or the screw may also be employed for compensating for various thicknesses of the metal for forming the seam. The compressible connection is provided within the link *h*, which link is made of two or more parts or members, so as to telescope, and contains a stiff spring or cushion for resisting compression. In the construction shown the link *h* is made up of the following parts: an outer shell or socket-piece *l*, which may project to one side, as shown, and which receives the crank-stud *i*. Within this socket-piece moves a piston or plunger *m*, which is connected by a stem *p* with an eye jointed to the arm *g′* of the carrier G. The connection between *p* and *m* is preferably adjustable by the one screwing into the other, as shown, whereby the total length of the link *h* may be varied. Between the plunger *m* and a plug *l′*, screwed in the end of the shell *l*, is confined a rubber cushion *q*, or it might be a stiff spiral spring, the compression of which is regulated by screwing the plug *l′* in or out. Normally the plug *q* keeps the plunger *m*

pressed to the end of the shell *l*, as shown in Fig. 5; but when the crank is passing its dead-center the stoppage of the carrier G by the stop *k* arrests the plunger *m*, while the shell *l*, following the movement of the crank, is forced beyond the plunger, as shown in Fig. 7, thereby compressing the cushion *q*.

The operation is as follows: A can or other object to be seamed (an example of which is shown at *x* in Fig. 1) is moved upwardly against the chuck I at the time when the seaming-rolls E are retracted, as shown in Fig. 5. This feeding operation may be performed by hand or by any suitable means. The automatic means for feeding will be described later. The chuck I is shaped to exactly fit within the seam to be formed, so as to support that seam during its formation, as is well understood. When the object to be seamed has been thus forced up onto the chuck and while it is held firmly thereon, the seaming-rolls, which are constantly revolving in an orbit parallel, or approximately so, with the seam, but so far outside of it as to be entirely out of contact with it, are caused to very gradually move inward, so that effectually their orbit becomes contracted. During this gradual inward movement the seaming-rolls first encounter the outer edge of the flange to be seamed and then turn in the outer and inner flanges in the well-known manner, finally flattening them against the chuck to form the double seam. These operations in themselves are common and well understood and may be performed either by a single roll or by two rolls with like grooves or by two rolls with unlike grooves, depending upon the nature of the seam to be formed. The final rolling or compacting of the seam is accomplished by a movement of the seaming-rolls in an orbit exactly parallel with the outline of the chuck, this being accomplished by the stop *k* and the compression of the cushion *q*, as already described. Then the rolls gradually move outward or expand their orbits, whereby they free the seam and leave the seamed article to be detached and removed downwardly and from the chuck, which feeding-off operation may take place during the gradual outward movement of the seaming-rolls. Assuming, for example, that the seaming-rolls move inward and outward during fifteen complete revolutions, the proportions may, for example, be such that the inward movement occupies six turns, the concentric movement three turns, and the outward movement six turns. In this case the first two or three turns of the inward movement (depending upon the width of the flanges to be seamed) will ordinarily be an idle movement, covering the clearance beyond the flanges, so that the actual turning of the flanges would occupy about three or four turns, followed by the final flattening or rolling down of the seam for about three turns, after which one or two turns of the outward movement would be sufficient to release the seam and permit the article to be withdrawn. After the seam has been rolled down against the chuck it is liable to adhere to the chuck, so that some pressure is required to force the article off, and to facilitate this operation I preferably employ a spring-pad, such as is commonly used in punching and drawing presses, for forcing the finished punching from the die. An example of this is shown in Fig. 6, where *r* is the head of the pad, mounted on a sliding shank *r'*, passing up within a socket in the spindle J and receiving above the downward pressure of a stiff spring r^2, the pressure of which ejects the seamed article, the downward movement of the pad being stopped by the end of a slot in the shank striking a cross-pin r^3. Any other means for removing the seamed article may, however, be substituted.

It is customary in seaming-machines to feed the article to be seamed into place while the seaming-tools are stationary and then by moving a treadle or other lever to engage a clutch whereby to drive the machine through a determined cycle of movements sufficient to accomplish the seaming of the one article and to then retract the seaming-tools to free the seam, whereupon the parts come to rest and the seamed article is removed and the feeding operation is repeated. This intermittent operation is necessarily slow, and it is one object of my invention to increase the rapidity of seaming by making the operation continuous and by substituting machine-feeding for hand-feeding of the articles to be seamed. Accordingly I have devised a feeding mechanism, which I will now describe, the object of which is to withdraw each finished article as soon as its seam has been freed by the first outward movement of the seaming-rolls and quickly carry it out of the way, while the next article to be seamed is brought into place and moved up against the chuck during the remaining outward movement of the rolls or tools before their inward movement has carried them so far that they would encounter the flanges to be seamed.

The shaft Q, on which are fixed the gears P P', is prolonged downward and carries at its lower end a worm Q', which drives a worm-wheel R' on a horizontal shaft R, which shaft carries a cam S. A vertically-moving frame or plunger T carries a roller *t*, which is engaged by the cam-groove S' of the cam S, whereby this cam imparts a rising-and-falling movement to the plunger. As the plunger rises it lifts a work-carrier U, Fig. 1, which is formed with a plug or projection *u*, on which the can or article *x* to be seamed is placed and by which it is properly centered or alined with the chuck I, so that as the carrier U is elevated by the plunger the article is forced up and fitted onto the chuck, where it is held during the seaming operation, at the end of which the carrier U is lowered to remove the article. It is within my invention to use only a single carrier U and to drop it far enough in a straight line below

the chuck to enable the seamed article to be removed from it by hand, while a new article to be seamed is immediately thereafter placed upon it, also by hand, the dwell of the carrier in its lowermost position being sufficiently prolonged to permit of these manual feeding operations while the uninterrupted movement of the seaming mechanisms proceeds; but to enable a higher speed to be attained I provide for the use of several carriers U, which are brought in rotation into coincidence with the plunger T beneath and the chuck I above. These carriers U U are mounted above an intermittently-revolving table V, turning on a central stud V′, with any suitable mechanism for intermittently revolving it. Each carrier U is mounted on an upright spindle U′, having a spline for preventing its rotative displacement, these spindles projecting beneath the table V. Each spindle is brought in turn into coincidence with the plunger T, so that when the plunger rises it will encounter the spindle and force it and the carrier up. For intermittently turning the table I provide a Geneva stop-movement, comprising a crank W and a vertical shaft W′, which is continuously rotated from the shaft R by miter-gears, the stud of the crank entering successively radial notches V^2 in the table V. The crank W carries a mutilated disk *w*, which enters recesses *w′* in the table to hold it stationary between its movements. The plunger T descends far enough so that the crank-arm W may sweep over it. The seamed article is carried around by the carrier U until it reaches the uttermost position, (shown at the left in Fig. 1,) where it is clear of the head D and the parts carried thereby and where it dwells during one entire seaming operation, which gives the operator ample time to remove the seamed article and put in its place one to be seamed, whereupon the latter is carried around and finally brought into coincidence with the chuck and forced up onto the chuck to be seamed.

The plunger T is preferably made in two parts in order to permit of vertical adjustment. To this end its upper portion is made as a cylindrical spindle or plunger, while its lower part T′ is made as a frame preferably straddling the shaft R and carrying the roller *t* at its lower part, which latter is guided on a fixed pin T^2. The connection between the plunger T and lower frame T′ is made adjustable in any suitable way, preferably by uniting the former to the latter by clamping means. To this end the frame T′ is split or bisected at its upper part and is clamped upon the plunger T by a bolt *y*, which draws its bisected portions together. To facilitate the vertical adjustment of the plunger T, I provide a lever T^3, fulcrumed on the bolt *y* and having its short arm engaging a slot in the plunger T, as shown in Fig. 2, so that by loosening the bolt it is easy to move this lever until the plunger T is brought to the desired vertical adjustment, whereupon the bolt is retightened.

It is important to allow a certain elasticity in the lifting movement of the carrier U in order to crowd the article to be seamed firmly but yieldingly upon the chuck. To this end I introduce a yielding or elastic take-up device at some point between the supporting-carrier and the actuated cam. This might be introduced into each spindle U′, but I prefer to introduce such yielding take-up into the one plunger T. To this end the plunger is made hollow, as shown in Fig. 2, and in its upper end is fitted a small plunger or cushion-pin *t′*, the lower end of which rests upon the rubber plug or cushion t^2, which cushion is supported at its lower end upon the adjusting-screw t^3. The pin *t′* has a fixed amount of projection above the plunger, and the resilience of the rubber cushion is adjusted by setting the screw t^3 up or down within the plunger.

It must not be inferred from the minuteness of detail with which I have described the preferred construction of the machine embodying my invention that I am necessarily limited to the details of construction set forth. My invention is susceptible of a wide range of modification, and many structural features described may be replaced by mechanical equivalents. Certain parts may also be wholly omitted without rendering inoperative the remaining parts. My invention is not to be limited to the mounting of the seaming-carrier G upon the contour-carrier F, as the reverse arrangement might be substituted. Certain of the mechanism provided by my invention might be applied in a machine wherein the head D or other support for the seamers was stationary and the object to be seamed was made to rotate.

My invention is applicable with slight modification for use with the seaming of circular articles, for which purpose it is only necessary to omit the contour-carrier or fix it so that it cannot move toward or from the center, whereby any point on this carrier would describe a circular path. I have shown in Figs. 11 and 12 two ways of accomplishing this change, whereby the one machine may be useful for seaming either non-circular or circular articles. In Fig. 11 the carrier F has been removed and an adjustable piece F′ provided in its place, on which the carrier G is pivoted, so that this pivotal point is fixed with relation to the head D. The chuck (lettered I′) is of course circular. To accommodate a chuck of larger or smaller diameter, it is only necessary to set the pivotal point of the lever G out or in by adjusting the piece F′ out or in, for which purpose the latter is made with slots engaged by set-screws *c′*, entering the head D. In Fig. 12 the carrier F is retained, the carrier G and link *h* being removed for greater clearness; but the roller *c* is disconnected, and instead the free end of the carrier F is fastened by a screw to an ad-

justable piece F^2, which has a slot and is fastened by a set-screw c^2 to the head D, whereby the outer end of the carrier F may be set to a greater or less distance from the center in order to accommodate any diameter of circular chuck I'.

What I claim is—

1. In a seaming-machine, the combination of a non-circular stationary chuck, a seamer revolving around said chuck, a carrier for said seamer, and mechanism for imparting to said carrier during a prescribed cycle of its revolutions around the chuck a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring the seamer out of action.

2. In a seaming-machine, the combination of a non-circular stationary chuck, a seamer revolving around said chuck, a carrier for said seamer, and mechanism for imparting to said carrier during a prescribed cycle of its revolutions around the chuck a movement toward the chuck to bring the seamer into action, then a movement parallel with the chuck during more than one complete revolution to press down the seam, and finally a movement from the chuck to bring the seamer out of action.

3. In a seaming-machine, the combination of a stationary chuck, a seamer revolving around said chuck, a contour-carrier, a mechanism for imparting to it during each revolution movements toward and from the chuck to cause the seamer to revolve in an orbit substantially parallel with the seam to be formed, a seaming-carrier, a mechanism for imparting thereto during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action and a movement from the chuck to bring the seamer out of action, the seamer being carried by both said carriers and having a movement compounded of the movements of said carriers.

4. In a seaming-machine, the combination of a non-circular stationary chuck, a seamer revolving around said chuck, a contour-carrier, and a seaming-carrier for said seamer, mechanism for imparting to said contour-carrier inward and outward movements adapted to cause the seamer to travel in an orbit substantially parallel with the seam to be formed, and mechanism for imparting to said seaming-carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring the seamer out of action.

5. In a seaming-machine, the combination of a chuck, a seamer, a contour-carrier and a seaming-carrier jointly supporting said seamer so that the latter has a movement compounded of the movements of both, means for imparting to the contour-carrier during each revolution inward and outward movements adapted to cause the seamer to conform to the shape of the seam, and means for imparting to the seaming-carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action.

6. In a seaming-machine, the combination of a non-circular chuck, a cam having its outline corresponding to the contour of the seam to be formed, a contour-carrier actuated by said cam, a seaming-carrier, mechanism for imparting to the latter during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action and a movement from the chuck to bring the seamer out of action, and a seamer carried by both said carriers whereby it receives a movement compounded of their respective movements.

7. In a seaming-machine, the combination of a chuck, a contour-carrier, a seaming-carrier mounted thereon, a seamer mounted on said seaming-carrier, means for imparting to said contour-carrier during each revolution inward and outward movements adapted to cause the seamer to follow the contour of the seam to be formed, and means for imparting to said seaming-carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action.

8. In a seaming-machine, the combination of a stationary chuck, a seamer revolving around said chuck, a revolving head, a contour-carrier and seaming-carrier carried by said head and carrying said seamer, means for imparting to said contour-carrier during each revolution inward and outward movements adapted to cause the seamer to move in an orbit parallel with the seam to be formed, and mechanism carried by said head adapted to impart to said seaming-carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action.

9. In a seaming-carrier, the combination of a stationary chuck, a seamer revolving around said chuck, a revolving head, a contour-carrier and seaming-carrier carried by said head and carrying said seamer, means for imparting to said contour-carrier during each revolution inward and outward movements adapted to cause the seamer to move in an orbit parallel with the seam to be formed, and mechanism for imparting to the seaming-carrier movements toward and from the chuck during a prescribed cycle of revolutions, said mechanism comprising a moving part carried by the head adapted to communicate its movement relatively to the head to said seaming-carrier, and differential gearing adapted to impart to said moving part a slow rotation relatively to said head.

10. In a seaming-machine, the combination of a stationary chuck I, a revolving head D, a seaming-carrier carried by said head, a seamer carried by said carrier, and mechanism for imparting to said carrier inward and

outward movements during a prescribed cycle of revolutions consisting of differential gears L, P, P′, L′ adapted to impart to the gear L′ a movement at approximately the same speed as said head but differentiated therefrom, a pinion carried by said head and responding to such differential movement, and means for communicating the rotation of said pinion to said carrier.

11. In a seaming-machine, the combination of a stationary chuck I, a revolving head D, a seaming-carrier carried by said head, a seamer carried by said carrier, and mechanism for imparting to said carrier inward and outward movements during a prescribed cycle of revolutions consisting of a spindle K carried by said head, differential gearing for rotating said spindle slowly relatively to said head, and connecting means for imparting movement from said spindle to said carrier.

12. In a seaming-machine, the combination of a stationary chuck I, a revolving head D, a seaming-carrier carried by said head, a seamer carried by said carrier, and mechanism for imparting to said carrier inward and outward movements during a prescribed cycle of revolutions consisting of a spindle K carried by said head, differential gearing for rotating said spindle slowly relatively to said head, a crank on said spindle, and a connecting-rod connecting said crank to said carrier.

13. In a seaming-machine, the combination of a stationary chuck I, a revolving head D, a seaming-carrier carried by said head, a seamer carried by said carrier, and mechanism for imparting to said carrier inward and outward movements during a prescribed cycle of revolutions consisting of a spindle K carried by said head, differential gearing for rotating said spindle slowly relatively to said head, a crank on said spindle, a stop for limiting the inward movement of said carrier, a connecting-rod connecting said crank to said carrier, and a yielding medium interposed between said crank and carrier adapted to yield when the carrier is stopped.

14. In a seaming-machine, the combination of a stationary chuck I, a revolving head D, a seaming-carrier carried by said head, a seamer carried by said carrier, and mechanism for imparting to said carrier inward and outward movements during a prescribed cycle of revolutions consisting of a spindle K carried by said head, differential gearing for rotating said spindle slowly relatively to said head, a crank on said spindle, a stop for limiting the inward movement of said carrier, a connecting-rod for connecting said crank to said carrier, said rod comprising relatively movable parts, with a yielding member joining said parts adapted to yield when said carrier is forced against said stop.

15. In a seaming-machine, the combination of a chuck, a seamer, a carrier for said seamer, mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, a stop for limiting the movement of the seamer toward the chuck, and a yielding medium interposed in said mechanism whereby the seamer is forced yieldingly against the seam until it encounters said stop.

16. In a seaming-machine, the combination of a chuck, a contour-carrier and seaming-carrier, a seamer carried by said carriers, the contour-carrier formed as a pivoted arm and the seaming-carrier mounted thereon, a stud on which said arm is pivoted, a crank-shaft passing through said stud and arranged eccentrically therein, mechanism for rotating said crank-shaft, and a connection between its crank and the seaming-carrier, said crank arranged to come into coincidence with the center of said stud when the seaming-roll is finishing the seam, whereby the seaming-carrier is uninfluenced by the movements of the contour-carrier.

17. In a seaming-machine, the combination of a stationary chuck I, a stationary cam H, a revolving head D, a contour-carrier and seaming-carrier carried by said head, a seamer carried by said carriers, a gear M concentric with said head, differential gearing for rotating said gear at a speed slightly different from that of said head, a shaft K having a pinion K′ meshing with said gear, a connection between said shaft and the seaming-carrier, and a connection between the contour-carrier and said cam.

18. In a seaming-machine, a stationary non-circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for machine-feeding the work thereto comprising a work-carrier and means for moving said carrier to carry the work to the seaming position during the period of inactive operation, holding it there during the seaming operation, and retracting it therefrom as soon as the seaming mechanisms have completed the seam and ceased to act upon it.

19. In a seaming-machine, a stationary chuck, a seamer revolving around said chuck, a carrier for said seamer and mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with a work-carrier and mechanism operating once to each such cycle of revolutions adapted to move the article to be seamed against said chuck, while the seamer is remote therefrom, to hold it thereagainst during the seaming operation, and to remove it therefrom after the seamer has formed the seam.

20. In a seaming-machine, a stationary non-

circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a series of work-carriers, each adapted to hold the work fixedly against the chuck during the seaming operation, an intermittently-advancing part bearing said carriers, and mechanism adapted to move a work-carrier to the seaming position while the seamer is remote from the chuck, to hold it there during the seaming operation, to retract it immediately after the completion of the seam, and thereupon to advance said moving part to bring another carrier into position.

21. In a seaming-machine, a stationary non-circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a work-carrier U, a plunger T adapted to elevate said work-carrier to bring the work to the seaming position, to hold it there during the seaming operation, and thereupon to lower it for removing the finished work, and driving mechanism for operating said plunger.

22. In a seaming-machine, a stationary non-circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a work-carrier U, a plunger T adapted to elevate said work-carrier to bring the work to the seaming position, to hold it there during the seaming operation, and thereupon to lower it for removing the finished work, driving mechanism for operating said plunger, and means for adjusting the height of said plunger.

23. In a seaming-machine, a stationary non-circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a work-carrier U, a plunger T adapted to elevate said work-carrier to bring the work to the seaming position, to hold it there during the seaming operation, and thereupon to lower it for removing the finished work, driving mechanism for operating said plunger, and a yielding member interposed between said carrier and said driving mechanism whereby the work is forced yieldingly against the chuck.

24. In a seaming-machine, a stationary non-circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a work-carrier U, a plunger T adapted to elevate said work-carrier to bring the work to the seaming position, to hold it there during the seaming operation, and thereupon to lower it for removing the finished work, driving mechanism for operating said plunger, and a yielding member in said plunger.

25. In a seaming-machine, the combination with continuously-rotating seaming mechanisms of means for feeding the work thereto comprising a work-carrier U, a plunger T adapted to elevate said work-carrier to bring the work to the seaming position, to hold it there during the seaming operation, and thereupon to lower it for removing the finished work, and driving mechanism for operating said plunger, said plunger having a cushion t^2 within it, a pin t' pressed by said cushion, and an adjusting device t^3 for varying the compression of said cushion.

26. In a seaming-machine, a stationary non-circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a work-carrier U, a plunger T adapted to elevate said work-carrier to bring the work to the seaming position, to hold it there during the seaming operation and thereupon to lower it for removing the finished work, a reciprocating frame T′ adjustably engaging said plunger, and a cam for reciprocating said frame.

27. In a seaming-machine, the combination with continuously-rotating seaming mechanisms of means for feeding the work thereto comprising a work-carrier U, a plunger T adapted to elevate the work-carrier to bring the work to the seaming position, to hold it there during the seaming operation, and thereupon to lower it for removing the finished work, a reciprocating frame T′, a clamp uniting it to said plunger, a lever T^3 for adjusting the plunger relatively to said frame, and a cam for reciprocating said frame.

28. In a seaming-machine, a stationary non-

circular chuck, a seamer revolving continuously around said chuck, a carrier for said seamer and a continuously-operating mechanism for imparting to said carrier during a prescribed cycle of revolutions a movement toward the chuck to bring the seamer into action, and a movement from the chuck to bring it out of action, combined with means for feeding the work to said chuck comprising a series of work-carriers U U, an intermittently-rotating table V carrying them, and a reciprocating plunger T adapted to elevate one of said carriers to bring its work to the seaming position, and mechanisms for intermittently rotating said table and for raising and lowering said plunger.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

OTTO S. BEYER.

Witnesses:
C. J. ELLSWORTH,
CHAS. L. LIPP.