No. 786,973. PATENTED APR. 11, 1905.

M. J. KENNY.

MACHINE FOR END SEAMING SHEET METAL BODIES.

APPLICATION FILED APR. 18, 1904.

4 SHEETS—SHEET 1.

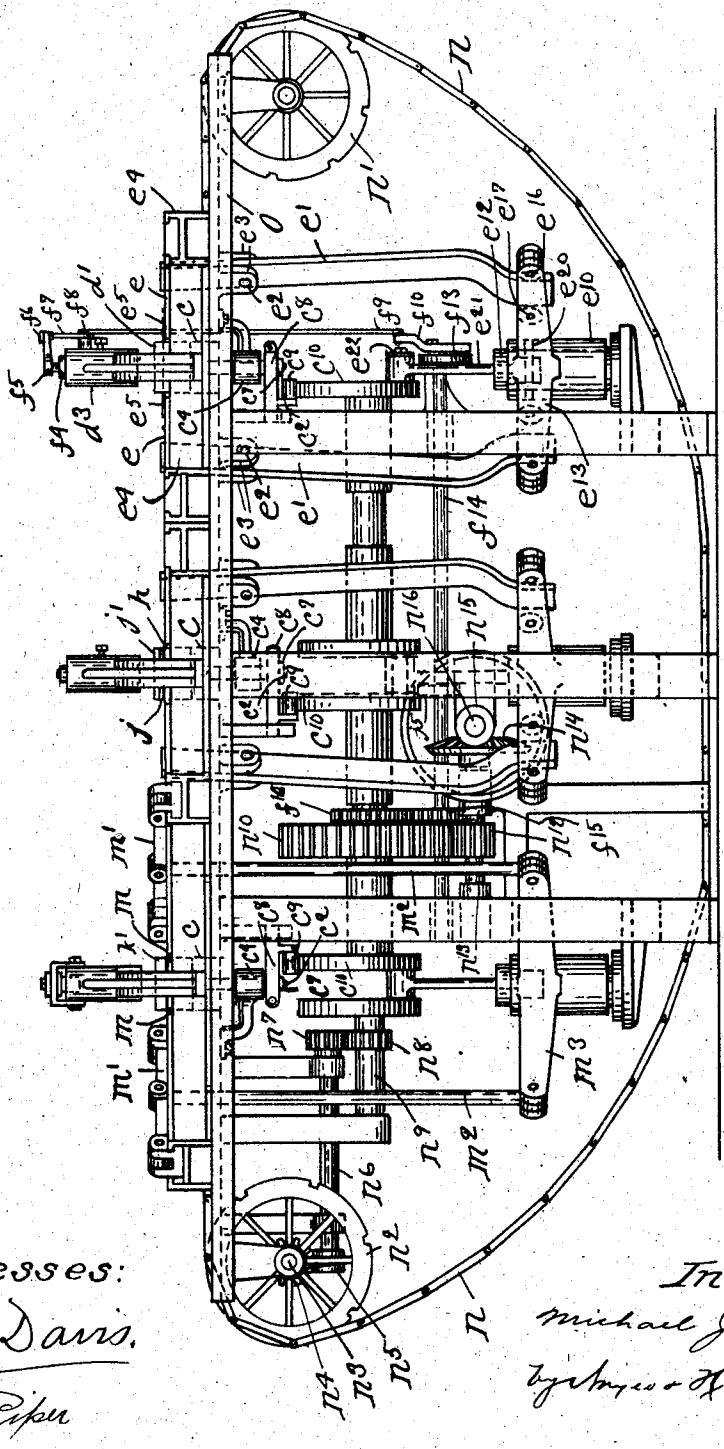

Fig. 1.

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M. M. Piper

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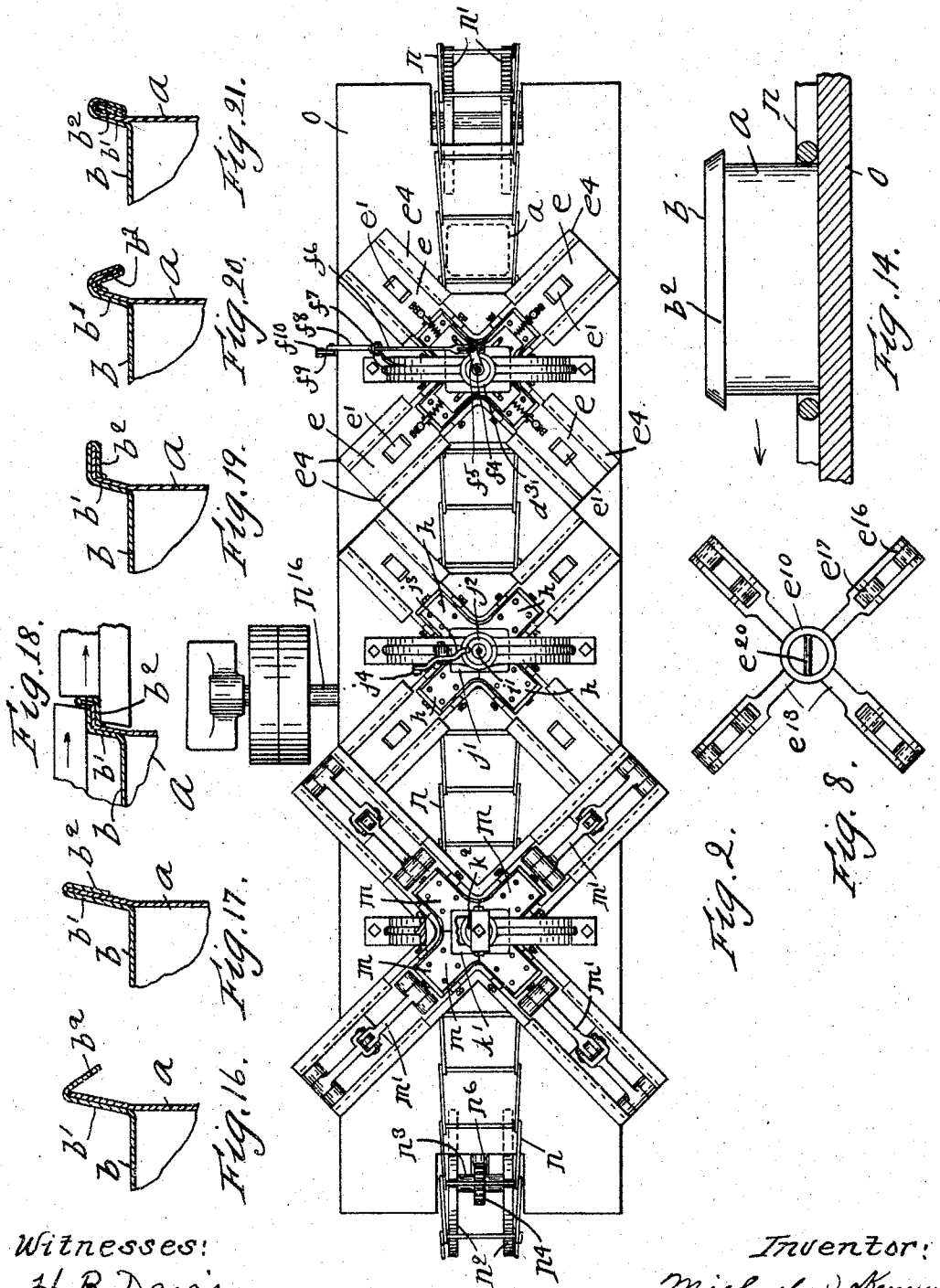

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4 SHEETS—SHEET 3.

Fig. 3.

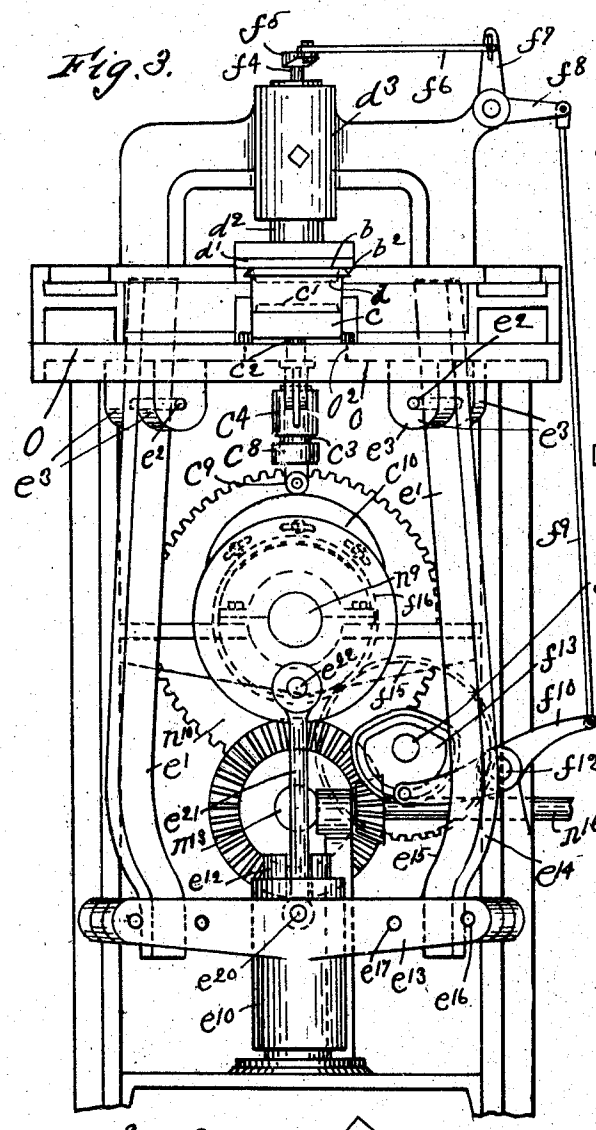


Fig. 4.

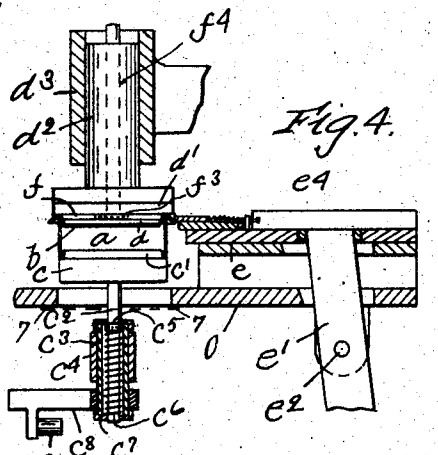


Fig. 15.

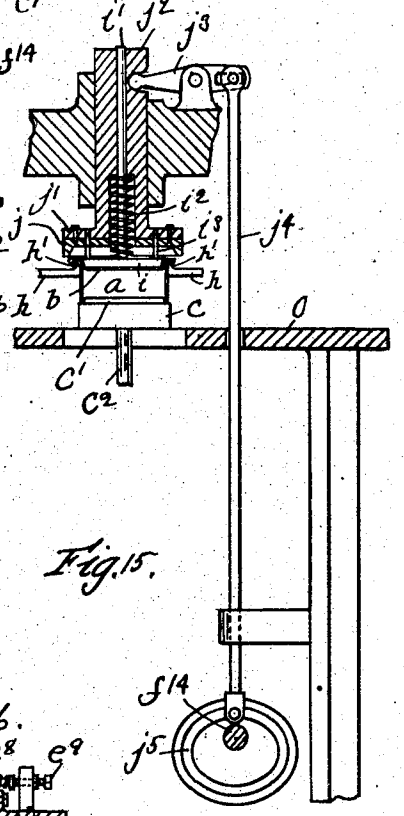


Fig. 7.

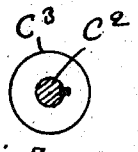


Fig. 5.

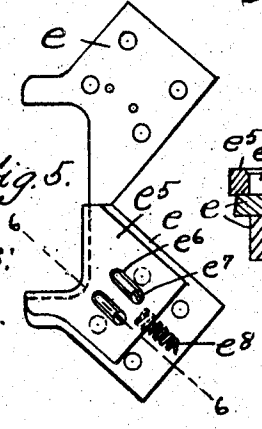
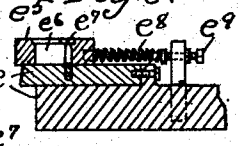


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 9.

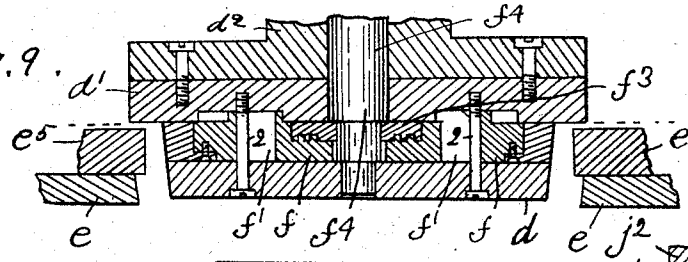


Fig. 10.

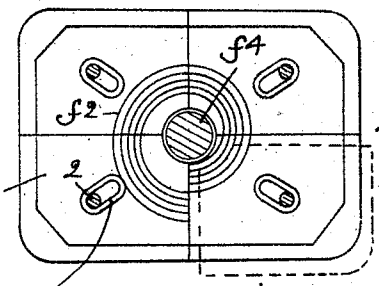


Fig. 23.

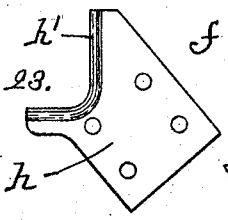
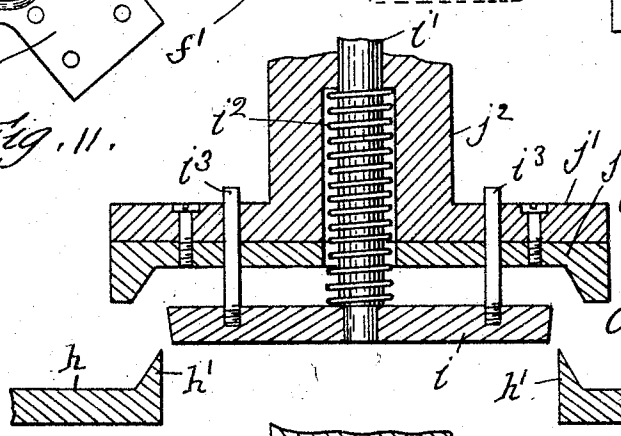


Fig. 11.



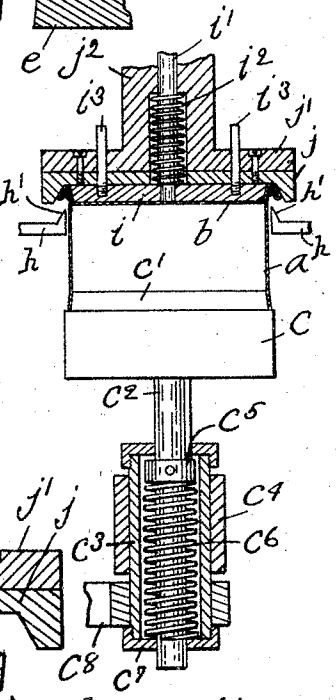
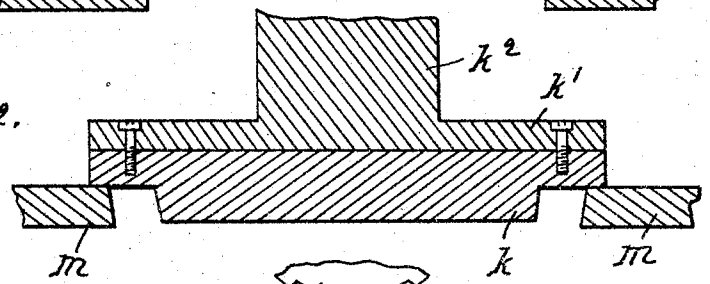


Fig. 22.

Fig. 12.



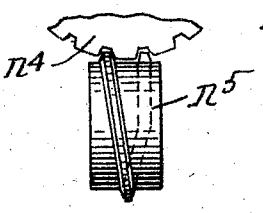


Fig. 13.

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No. 786,973. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

MICHAEL J. KENNY, OF EAST WALPOLE, MASSACHUSETTS.

MACHINE FOR END-SEAMING SHEET-METAL BODIES.

SPECIFICATION forming part of Letters Patent No. 786,973, dated April 11, 1905.

Application filed April 18, 1904. Serial No. 203,570.

To all whom it may concern:

Be it known that I, MICHAEL J. KENNY, of East Walpole, county of Norfolk, State of Massachusetts, have invented an Improvement in Machines for End-Seaming Sheet-Metal Bodies, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to machines for end-seaming sheet-metal bodies, and has for its object particularly to construct a machine for end-seaming flangeless bodies to produce the sheet-metal article shown in my application for Letters Patent Serial No. 201,408 and embodying the method of making the same which is shown in my application for Letters Patent Serial No. 190,637. The article shown in my application Serial No. 201,408 consists of a body having heads or ends secured thereto, said article being used as a can for packing sardines and the like, and the essential feature of novelty consists in a filling-strip formed integral with the head or end which is inclosed within the seam by which the head or end is attached to the body and which when the seam is severely compressed acts to crowd the inner folds of the seam in such manner as to close all crevices or recesses. In the manufacture of this article I employ as the essential parts thereof a flangeless body and a head or end having a bent seaming-flange which is placed upon and which incloses the flangeless end of the body, and by suitable means—as, for instance, by the machine forming the subject-matter of this application—the outer portion of the seaming-flange on the head is first pressed inward against the body. Then the seaming-flange, together with the flangeless end portion of the body, is drawn outward while the extreme edge of the seaming-flange is held. Then the seaming-flange and inclosed portion of the body are bent and drawn downward while said extreme edge of the seaming-flange is still held. Then the seaming-flange and inclosed portion of the body are bent inward against the body and severely compressed, the edge of the seaming-flange being thereby inclosed and compressed and acting as a filling-strip to crowd the inner folds of the seam in such manner as to close all crevices or recesses. The machine embodying this invention is adapted to attach either end to the flangeless body. Therefore when speaking of the head it will be understood that I mean either end of the article.

Figure 1 shows in side elevation a machine for end-seaming sheet-metal bodies embodying this invention. Fig. 2 is a plan view of the machine shown in Fig. 1. Fig. 3 is an enlarged front elevation of one of the heading or seam-forming devices of the machine and hereinafter referred to as the "first heading or seam-forming device" of the set or series. Fig. 4 is a sectional detail of a portion of the heading or seam-forming device shown in Fig. 3. Fig. 5 is a detail showing two main jaws and one auxiliary jaw of the set of jaws employed in the heading or seam-forming device shown in Fig. 3. Fig. 6 is a sectional detail of one of the main and one of the auxiliary jaws, taken on the dotted line 6 6, Fig. 5. Fig. 7 is a cross-section of the post bearing a platen, taken on the dotted line 7 7, Fig. 4. Fig. 8 is a plan view of the actuating device for the levers which operate the jaws. Fig. 9 is an enlarged vertical section of the center head of the first heading or seam-forming device. Fig. 10 is a plan view of the set of expanding dies of the center head shown in Fig. 9. Fig. 11 is an enlarged vertical section of the center head of the second heading or seam-forming device. Fig. 12 is a vertical section of the center head of the third heading or seam-forming device. Fig. 13 is a detail of the worm employed for intermittingly operating the feed-chain. Fig. 14 is a detail of a portion of the table on which the flangeless body, with an unattached head thereon, is placed and a portion of the feed-chain by which said parts are conveyed to the first heading or seam-forming device. Fig. 15 is a vertical section of the essential parts of the second heading or seam-forming device. Figs. 16 to 21 are sectional details of the seam, showing the relative positions of the several portions or folds as the seam is formed. Fig. 22 is a vertical section of the second heading or seam-forming device, the center head and platen being raised so as to

raise the article to free the jaws. Fig. 23 is a plan view of one of the jaws of the second heading or seam-forming device.

The machine comprises, essentially, three seam-forming or heading devices and a feeding device for automatically feeding the uncompleted articles successively thereto. The feeding device consists of an endless feeding-chain n, composed of two parallel sets of loosely-connected links, which are loosely connected together by cross-bars, and said feeding-chain passes over two chain-wheels n' at one end of the machine and over two chain-wheels n^2 at the other end of the machine. The chain-wheels n' are mounted on a shaft and are adapted to operate as idle wheels, and the chain-wheels n^2 are secured to a shaft n^3, bearing a worm-wheel n^4, which is engaged by a worm n^5, secured to a shaft n^6, bearing a pinion n^7, which is engaged by a pinion n^8, secured to a shaft n^9, bearing a toothed gear n^{10}, which is engaged by a pinion n^{12}, secured to a shaft n^{13}, bearing a bevel-gear n^{14}, which is engaged by a bevel-gear n^{15}, secured to the main driving-shaft n^{16}. The worm n^5 is of a special form in that it has its grooves extended spirally for a portion of its circumference, as shown in Fig. 13, and transversely for the remaining portion, and by such form of worm the chain-wheels n^2, which serve as the driving chain-wheels for the feed-chain n, will operate to drive said chain-wheels n^2 for a definite distance and then cease, thereby providing a feeding device for intermittingly moving along the uncompleted articles.

o represents a horizontal table which forms a part of the machine-frame, and that portion of the feed-chain n between the chain-wheels n' n^2 is supported upon and moves along on said table, and the uncompleted articles to be fed along are dropped into the openings of the feed-chain onto the table and are moved along on the table by the feed-chain. It is obvious that other forms of intermittent feeding devices may be employed to accomplish this result and also other forms of actuating mechanism for the feed-chain without departing from the spirit and scope of this invention.

A flangeless body, having a head secured to one end or not, is dropped into one of the openings of the feed-chain n onto the table o, and upon the flangeless end of said body a a head b is placed, which is provided with a seaming-flange. The seaming-flange, which is formed on the head b preparatory to placing said head on the flangeless body, comprises an upright portion b' and an outwardly-extended portion b^2. The feed-chain n moves the body a, with the unattached head supported thereon, along on the table o into engagement with the first heading or seam-forming device. This heading or seam-forming device is adapted to press inward the portion b^2 of the seaming-flange on the head (see Fig. 16) into engagement with the body a (see Fig. 17) and then, while holding the extreme edge of said portion b^2, to draw outward the upper portion of the seaming-flange, together with the upper end of the flangeless body a, which is inclosed by it, (see Figs. 18 and 19,) and then release the article preparatory to its being moved along to the next heading or seam-forming device.

The first heading or seam-forming device, as herein shown, is constructed as follows: The table o has a hole o^2 through it, or a recess in which is placed a platen c, which serves as a rest or support for the article while the head is being applied. The platen c is herein shown as having on its upper face a projection c', adapted to enter a shallow recess in the lower end of the article provided a head has been previously secured thereto having such shallow recess or to enter the lower end of the flangeless body if a head has not been applied, and said platen c is mounted upon a stem c^2, which passes down through a sleeve c^3, mounted to slide freely in a fixed bracket c^4, attached to the under side of the table. The stem c^2 has secured to it a collar c^5, and a spring c^6 encircles said stem, the upper end of which bears against said collar and the lower end of which bears upon the end piece c^7, secured to the lower end of the sleeve. A yielding connection is thereby provided between the stem bearing the platen and the sleeve. The sleeve has secured to it a laterally-projecting arm c^8, having a short depending arm provided with a pin c^9, with or without a roller thereon, which is adapted to engage a cam-disk c^{10}, which is secured to the main shaft n^9. As the shaft n^9 revolves the cam raises the sleeve and the platen c is correspondingly raised, together with the article which is placed upon it by the feed-chain. The platen is yieldingly supported particularly to provide for variations in the dimensions of the article and to thereby obviate the necessity of repeated adjustments, which would otherwise be required. The article is raised by the platen up against a center head, consisting of a plate d, rigidly secured by screws 2 or otherwise to a plate d', which is attached to a similar plate having a center post or stem d^2, which is vertically supported in a yoke or frame d^3, mounted on the table. The plate d of the center head is of suitable shape to enter the shallow recess in the head b formed by the seaming-flange, and the edges of said plate d are preferably slightly beveled, so that as the flangeless body and unattached head b thereon are moved up against said plate d the upper edge of the flangeless body will be bent outward slightly; yet this is not material. When the platen has raised the body and unattached head into firm engagement with the center head, it will be positively held while the seaming-flange is manipulated. Around the center head four main jaws are provided, made as horizontally-

disposed plates e, mounted on suitable supporting-plates and having angular engaging faces or edges to engage the corners of the article and portions of the sides thereof, so that the four jaws completely embrace or surround the article. These main jaws e are moved in and out in horizontal planes by levers e', which project through holes in said jaws e and which are pivoted at e^2 to ears e^3, depending from the table and which extend down into engagement with a suitable actuating device, which is constructed and arranged to simultaneously operate all the levers, and thereby move all the jaws. The jaws e are fitted to slide in guideways e^4, provided on the table. Auxiliary jaws e^5 are superimposed on the main jaws e, which have angular engaging edges or faces like the jaws e, and said auxiliary jaws e^5 are made as plates having slots e^6, which receive pins e^7, projected upwardly from the jaws e, and strong springs e^8, one for each jaw e^5, are interposed between an adjusting-screw e^9 and the rear edge of the jaw e^5, which acts to force said jaw forward beyond the engaging edge of the jaw e, yet permits it to yield when required. The auxiliary jaws e^5 being supported upon the main jaws e are moved, with said main jaws, by the actuating-levers e'. As the several main and auxiliary jaws are moved inward the extreme edge of the portion b^2 of the seaming-flange is first engaged by the auxiliary jaws and by said jaws is pressed inward toward the body, and as said portion is pressed inward its extreme edge is gradually brought down into position to be engaged by the main jaws e, so that when said main and auxiliary jaws have completed their inward movement the portion b^2 of the seaming-flange will be pressed firmly into engagement with the body, and the extreme edge of said portion will be held by the main jaws e. As an actuating device for the levers e' I have herein shown a sleeve e^{10}, mounted to slide vertically on a post e^{12} (see Figs. 3 and 8) and having four radially-extended arms e^{13}, provided with bifurcated ends, and the lower ends of the actuating-levers e' are curved or provided with curved engaging portions e^{14} e^{15}, and said lower ends extend down between the bifurcated ends of the arms e^{13}, and each arm has two transverse pins e^{16} e^{17}, with or without rolls thereon, which engage the curved engaging portions of the actuating-levers. As the sleeve e^{10} is moved downward the pins e^{17} will engage the curved engaging portions e^{15} of the several actuating-levers, and thereby move said levers in such manner as to move the several jaws inward to engage the seaming-flange, and as said sleeve is moved upward the pins e^{16} will engage the curved engaging portions e^{14} of the several actuating-levers, and thereby move said levers in such manner as to move the several jaws outward to disengage the seaming-flange. The sleeve e^{10} has a diametrically-disposed cross-bar e^{20}, to which is loosely connected the lower end of a link e^{21}, the upper end of which is connected to a crank-pin e^{22}, projecting from the cam-disk c^{10}. The portion b^2 of the seaming-flange having been pressed into engagement with the body, the next operation is to draw outward the seaming-flange, together with the upper end of the flangeless body, and to accomplish this result the center head is provided with a set of expanding dies which move outward and draw the seaming-flange while the latter is held by the main and auxiliary jaws, the former nipping the extreme edge of the portion b^2 and holding it firm with an unyielding pressure and the latter gradually yielding as the dies expand. The auxiliary jaws thus coöperate with the drawing-dies in drawing out the flange. Four expanding dies f (see Fig. 10) are employed to form a complete set, and they are made as plates having hardened-steel angularly-formed engaging edges or faces and also having guide-slots f' for the pins 2, which latter serve as guides for the dies whereby the several dies move outward radially from a common center. The several dies f are provided at their adjoining edges with several snail-grooves f^2, formed at the bottom of a recess, which latter contains a snail-plate f^3, the ribs of which fit the grooves formed in the dies, and said snail-plate f^3 is rigidly secured to an arbor f^4, which extends up through the stem of the center head, and to the upper end of said arbor an arm f^5 is secured, to which one end of a link f^6 is attached, the opposite end of which is connected to one arm, f^7, of a bell-crank lever, the other arm, f^8, of said lever being connected by a link f^9 with the outer end of a lever f^{10}, pivoted at f^{12}, the inner end of said lever having a pin, with or without a roll thereon, which engages a groove of a cam f^{13}, secured to a shaft f^{14}, which has a pinion f^{15} secured to it, which is engaged and driven by a pinion f^{16} on the main shaft n^9. As the cam f^{13} revolves the lever f^{10} will be moved up and down on its pivot, and the arbor f^4 will be oscillated and the snail-plate correspondingly moved and the several dies thereby positively moved in and out. The parts are so timed that the expanding dies move outward while the main and auxiliary jaws remain in their inward positions, so that as the seaming-flange on the head and the inclosed portion of the flangeless body is drawn outward by said expanding dies the main jaws will nip and continue to positively hold the extreme edge of the portion b^2 of the seaming-flange, and the auxiliary jaws will be caused to yield by the action of the expanding dies, gradually moving outward in unison with the expanding dies. The auxiliary jaws, it will be observed, coöperate with the expanding dies in drawing out the flange.

Referring to Figs. 14 and 16, the flangeless body is shown having a head thereon which

is provided with a seaming-flange, and in this condition the article is conveyed to the first head or seam forming device.

Fig. 17 represents the seam after the main and auxiliary jaws have been thrust inward, the portion b^2 of the seaming-flange being pressed into firm engagement with the body.

Fig. 18 represents the seaming-flange on the head, together with the upper end of the flangeless body as it is being drawn out to form the outwardly-extended flange, (shown in Fig. 19,) the extreme edge of the portion b^2 being held by the main jaw e and the auxiliary jaw yielding as the expanding dies move outward. The body, with the head attached thereto by the partially-formed seam, as shown in Fig. 19, is then disengaged by the first heading or seam-forming device and by means of the feed-chain n is conveyed to the next heading or seam-forming device.

The second heading or seam-forming device is constructed and arranged to bend and draw down the seaming-flange and inclosed end portion of the body from the position shown in Fig. 19 to the position shown in Fig. 20. This second heading or seam-forming device (see Figs. 11, 15, and 22) is constructed in many respects similar to the first heading or seam-forming device.

c represents the platen, which is made yielding, as in the aforesaid heading device, and which normally occupies a position in a hole or recess in the table and which is operated by a cam similar to the cam c^{10} (shown in Fig. 3) to raise the article up against the center head. The center head consists, essentially, of a center plate i, attached to a stem i', projecting up through the center of a stem j^2, and a spiral spring i^2 encircles said stem i', which is contained in a recess in the stem j^2 and which bears upon the center plate, tending to thrust it downward. The center plate i has two or more guide-pins i^3, which pass up through the die j and supporting-plate j', which serve to steady the center plate i. The center plate therefore exerts a yielding pressure on the head of the article. The die is made as a recessed plate having the inner side or face of its marginal projection inclined corresponding to the angle it is designed to give to the flange of the seam. The die j is secured by screws or otherwise to a supporting-plate j', which is formed on the stem j^2. The stem j^2 is moved vertically to thrust the die j down onto the seaming-flange of the article, and to accomplish this result one end of a pivoted lever j^3 engages said stem, and the opposite end thereof has loosely connected to it the upper end of a rod j^4, which passes down through a hole in the table o and bears at its lower end a pin, with or without a roll thereon, which engages a cam j^5, secured to the shaft f^{14}. As said shaft revolves the die j will be moved up and down. The second heading or seam-forming device also has a set of jaws h, similar to the main jaws e, there being four such jaws h provided in the set, and each jaw h is formed at its engaging edge with an upwardly-extending projection or rib h', having a vertical engaging face and also an inclined face upon which the seaming-flange is pressed. One of said jaws is represented in Fig. 23. These four jaws h are moved toward and from the center head by pivoted actuating-levers similar to the actuating-levers e'. The article placed on the platen is raised into engagement with the yielding center plate. Then the jaws h are moved inward into engagement with the article, the upper ends of the ribs h' just nipping the narrow edge of the portion b^2 of the seaming-flange, so as to hold said edge as the seaming-flange is subsequently drawn down. While the jaws are held in this position, acting to nip, and thereby hold, said narrow edge, the die j is depressed and the seaming-flange drawn down. On the return movement of the parts the die j first disengages the seaming-flange, and as it rises the article is raised bodily by reason of the yielding platen upon which it is supported acting against the yielding center plate, and when said article has been raised high enough for the flange to occupy a plane above the top of the rib h' the jaws h are moved outward, and, lastly, the platen is caused to descend and disengage the article. The article with the seam formed as shown in Fig. 20 is then conveyed to the third and last heading or seam-forming device and the seam finished, as shown in Fig. 21. The third and last heading device consists, essentially, of a yielding platen similar to the platen c and a center head consisting of a center plate k, secured to a supporting-plate k' by screws or otherwise, having a stem k^2. The article having been deposited upon the platen by the feed-chain n, said platen is raised and the article brought up against the center head. Then a set of jaws m, similar in contour to the jaws h, are moved into engagement with the flange of the seam and the flange pressed firmly into engagement with the body, and then the seam is severely compressed. The jaws m slide in ways provided for them and are connected to toggle-levers m', and rods m^2 are connected to said toggle-levers, the lower ends of which are connected to the extremities of the bifurcated arms m^3, which are constructed similar to the arms e^{13} and which are operated in substantially the same manner. The seam having been thus severely compressed, the narrow edge of the portion b^2 of the seaming-flange, which is contained within the folds of the seam, acts to crowd the inner folds in such manner as to effectually close all crevices or recesses. The article is then discharged from the machine.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for end-seaming sheet-metal

bodies, a heading device comprising a platen, means for moving it, a center head, a set of main jaws, and a set of auxiliary jaws above said main jaws, springs connected at one end with the main jaws and the opposite end with the auxiliary jaws for projecting said auxiliary jaws beyond the main jaws, and means for moving said main and auxiliary jaws toward and from the center head, substantially as described.

2. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen, means for moving it, a center head, a set of main jaws, means for moving them toward and from the center head, and a set of yielding auxiliary jaws located above said main jaws, substantially as described.

3. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen, means for moving it, a center head, a set of main jaws, means for moving them toward and from the center head, and a set of yielding auxiliary jaws borne by said main jaws, substantially as described.

4. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen, means for moving it, a center head, a set of main jaws, a set of auxiliary jaws, means for moving said main and auxiliary jaws toward and from the center head, a set of expanding dies borne by the center head, and means for moving said dies toward and from the jaws, substantially as described.

5. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen, means for moving it, a center head, a set of main jaws, a set of yielding auxiliary jaws located above said main jaws, means for moving said jaws toward and from the center head, a set of expanding dies borne by the center head which occupy a plane above the main jaws, and means for moving said dies, substantially as described.

6. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen and means for moving it, a center head, a set of main jaws, a set of yielding auxiliary jaws borne by said main jaws, means for moving said main jaws toward and from the center head, a set of expanding dies borne by the center head which occupy a plane above the main jaws, and means for moving said dies outward against the auxiliary jaws while the main jaws remain in their abnormal position, substantially as described.

7. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen, means for moving it, a center head, a set of expanding dies borne by said head having snail-grooves, a snail-plate for actuating said dies, and means for oscillating said snail-plate, substantially as described.

8. In a machine for end-seaming sheet-metal bodies, a heading device comprising a platen, a center head having a yielding center plate and a forming-die, means for operating said die, and a set of jaws movable toward and from said center head, each jaw having an upwardly-extended rib at its engaging edge, and means for raising the article while held between the platen and center plate sufficiently to free the jaws, substantially as described.

9. In a machine for end-seaming sheet-metal bodies, the combination with means for holding the body and unattached head thereon, of a set of horizontally-sliding jaws, pivoted actuating-levers connected therewith having curved engaging portions at their lower ends, a sliding actuating device which engages the curved engaging portions of said levers and moves said levers on their pivots and means for moving said actuating device, substantially as described.

10. In a machine for end-seaming sheet-metal bodies, the combination with means for holding the body and unattached head thereon, of a set of horizontally-sliding jaws, pivoted actuating-levers connected therewith having curved engaging portions at their lower ends, a sliding support bearing several radial arms having bifurcated ends bearing transverse pins, which engage the curved engaging portions of said levers and move said levers on their pivots, and means for moving said support, substantially as described.

11. In a machine for end-seaming sheet-metal bodies, the combination with means for holding the body and head thereon, of a set of horizontally-sliding jaws, toggle-levers connected therewith, rods connected to said toggle-levers, and a sliding actuating device to which said rods are connected and means for sliding said actuating device, substantially as described.

12. In a machine for end-seaming sheet-metal bodies, the combination with means for holding the body and head thereon, of a set of horizontally-sliding jaws, toggle-levers connected therewith, rods connected to said toggle-levers, a sliding support bearing several radial arms to which said rods are connected and means for moving said support, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MICHAEL J. KENNY.

Witnesses:
B. J. NOYES,
H. B. DAVIS.