

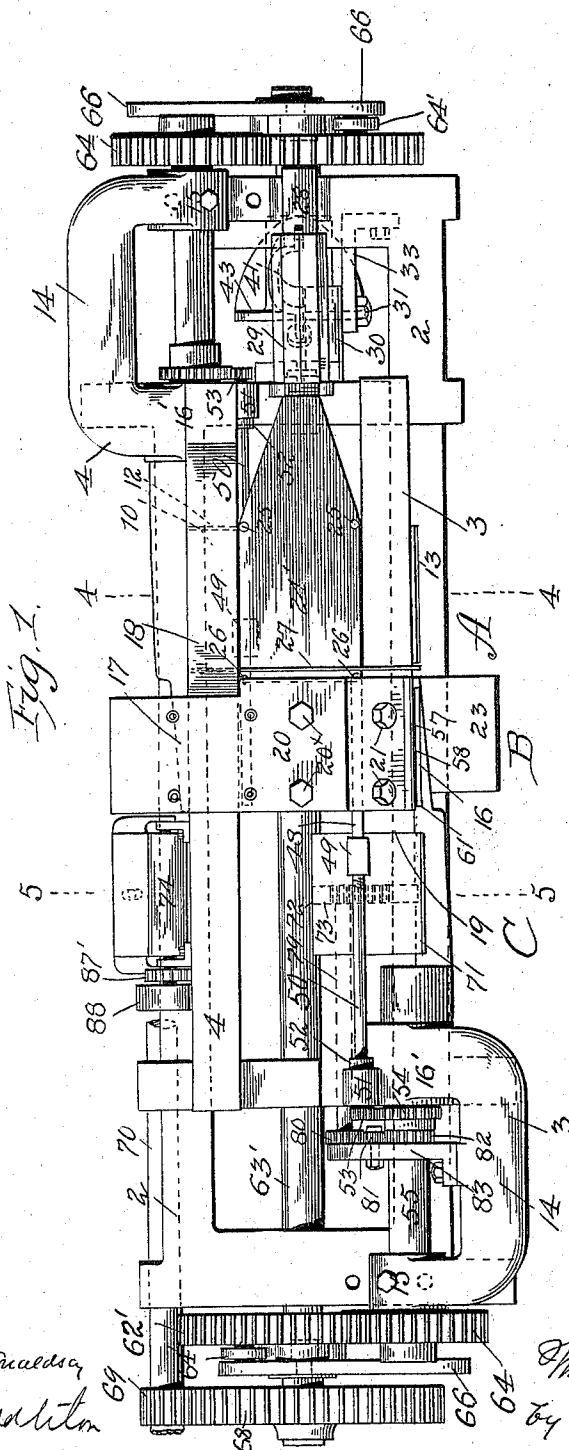
(No Model.)

4 Sheets—Sheet 1

W. D. BROOKS.  
CAN MACHINE.

No. 577,715.

Patented Feb. 23, 1897.



Attest  
F. L. Moulton

Inventor  
William D. Brooks  
by F. L. Moulton

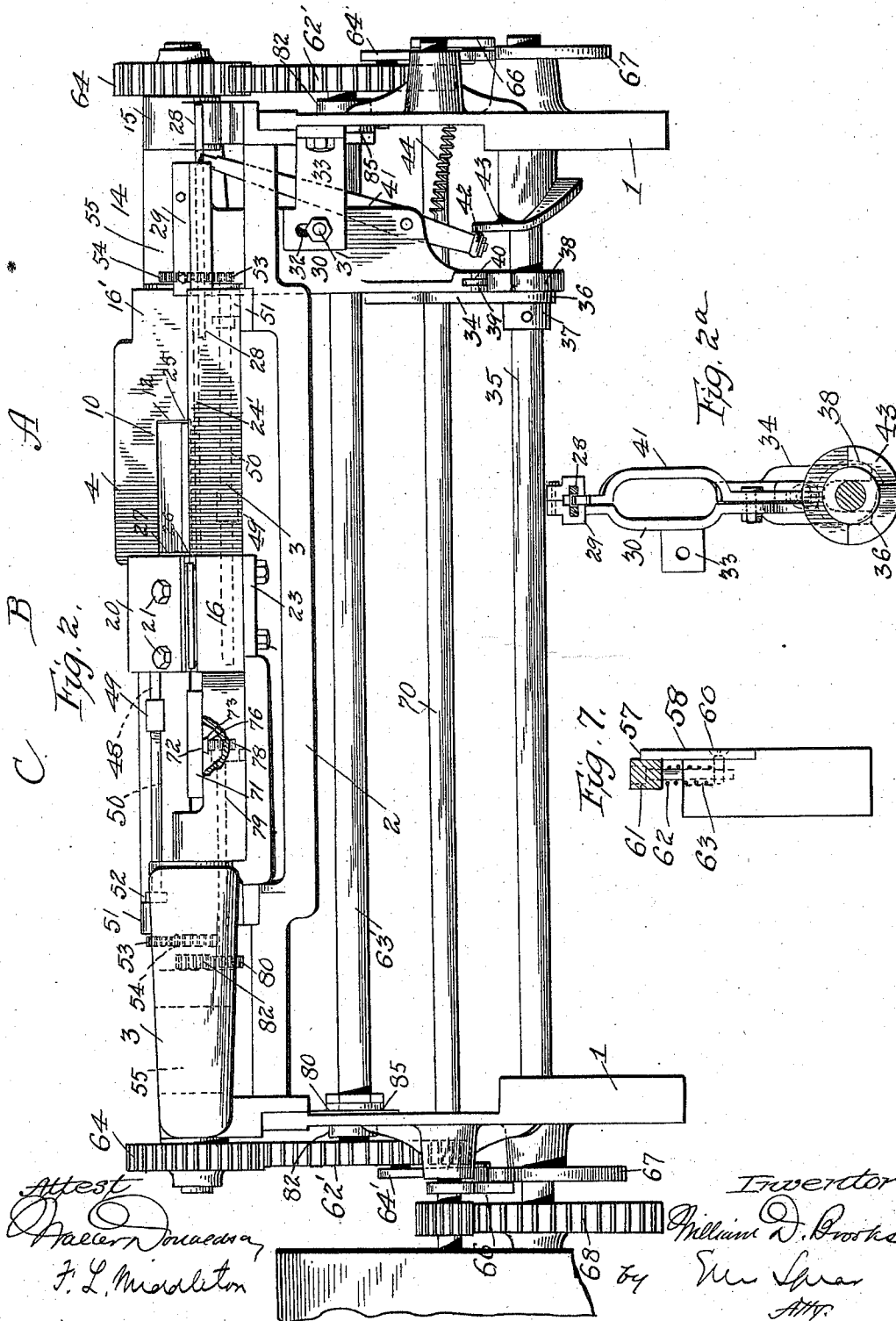
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4 Sheets—Sheet 2.

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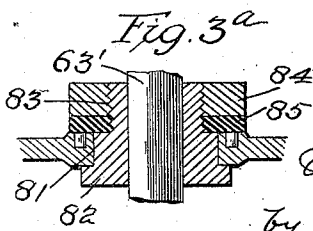
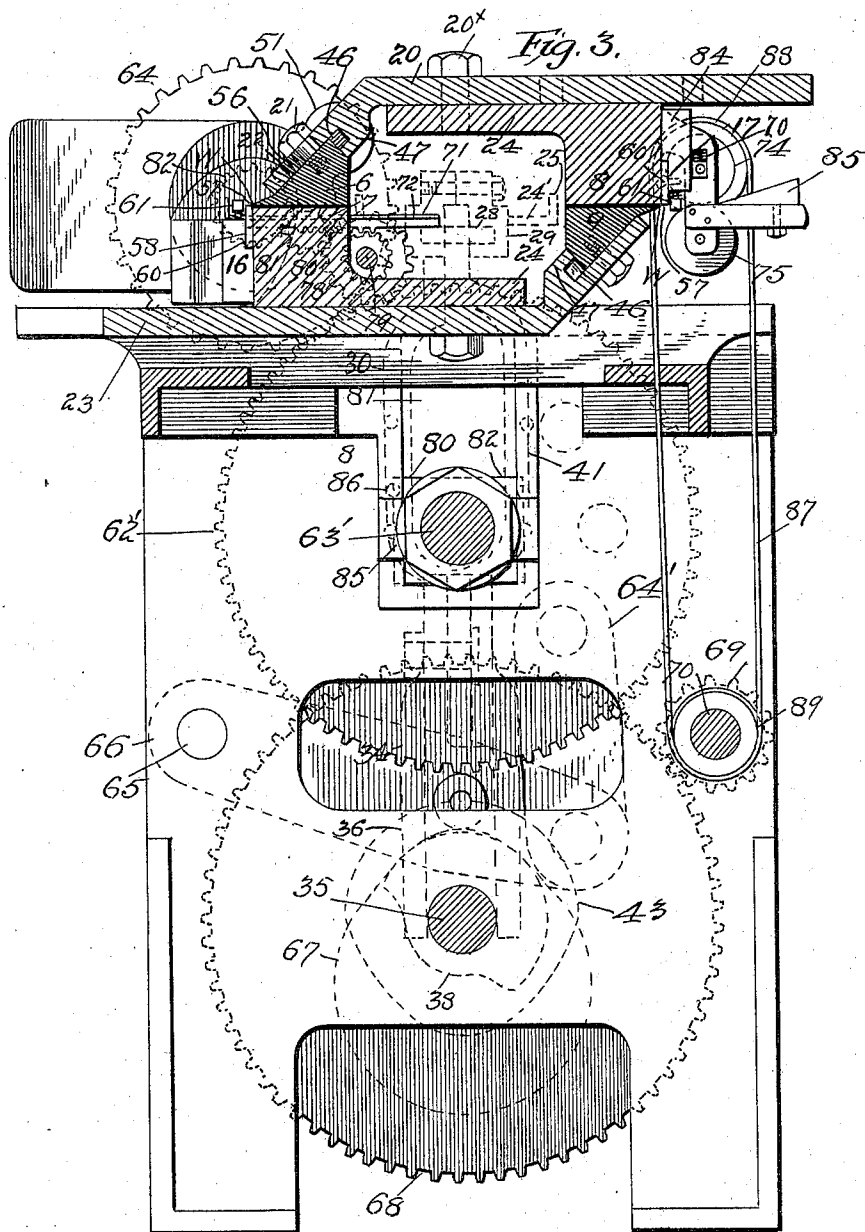
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4 Sheets—Sheet 3.

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CAN MACHINE.

No. 577,715.

Patented Feb. 23, 1897.



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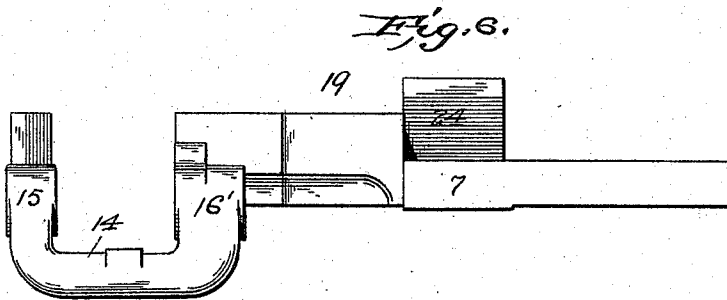
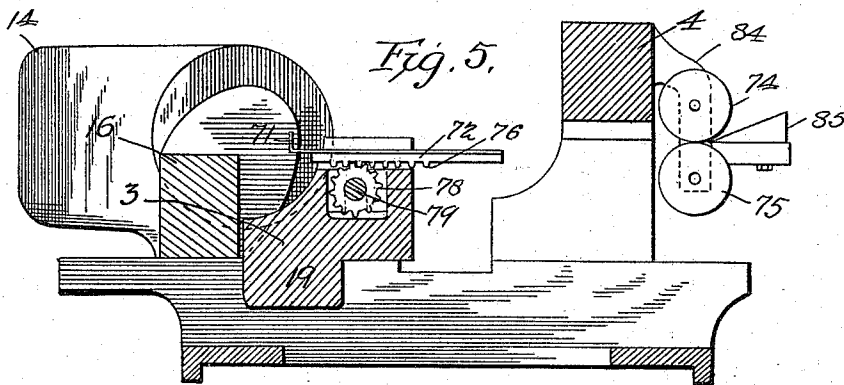
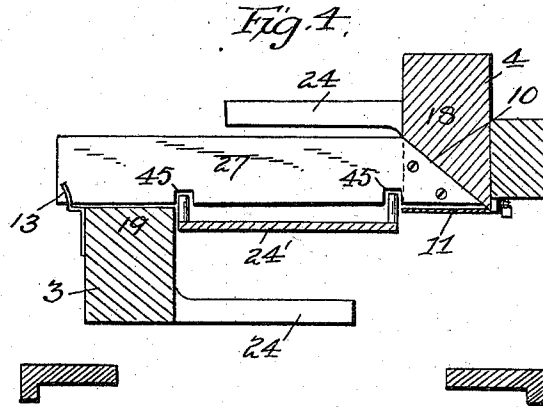
(No Model.)

4 Sheets—Sheet 4.

W. D. BROOKS.  
CAN MACHINE.

No. 577,715.

Patented Feb. 23, 1897.



Attest  
Malvern Malasa  
J. L. Mordant

Inventor  
William D. Brooks  
by Wm. Spear  
Att'y

# UNITED STATES PATENT OFFICE.

WILLIAM D. BROOKS, OF BALTIMORE, MARYLAND.

## CAN-MACHINE.

SPECIFICATION forming part of Letters Patent No. 577,715, dated February 23, 1897.

Application filed June 9, 1896. Serial No. 594,836. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM D. BROOKS, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Can-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to the manufacture of cans, and particularly to apparatus for forming the sheet-blanks into body-blanks, that is, blanks which have had their edges formed so as to interlock when brought together, and in which, also, the sheet of metal has been coiled or curved into such form that when the edges are interlocked a perfectly cylindrical can-body will be produced.

It is therefore my object to provide a machine for breaking the edges of the sheet of metal to form the interlocked side seam of the can and for bending this sheet into curved form, both operations taking place as the sheet of metal passes through the machine.

It is my object to produce a simple machine capable of carrying on the work rapidly by having the several operations performed simultaneously, that is, while one sheet-blank is having its edges broken the previously-broken blank is being bent into curved form and being discharged from the machine.

In the drawings, Figure 1 is a plan view; Fig. 2, a front view. Fig. 2<sup>a</sup> is an end view of the feed-slide mechanism; Fig. 3, a transverse section of the machine through the vise-jaws and breaking-arms. Fig. 3<sup>a</sup> is a view of a detail; Fig. 4, a section through the machine on the line 4 4 of Fig. 1; Fig. 5, a section on the line 5 5 of Fig. 1, and Fig. 6 is a detail view of one of the frame-bars. Fig. 7 is a detail of the break-arm.

The main frame of the machine comprises generally end standards 1, supporting between them a base-frame 2, which in turn supports supplemental frame-bars 3 4, which extend lengthwise of the machine at the front and rear, respectively, and carry the working parts, these supplemental frame-bars being adjustable toward and from each other, as will be hereinafter fully described, to adapt the machine for different sizes of cans.

The sheet-blanks of tin are fed into the

machine from the front laterally thereof at the point A to lie in a horizontal plane in line with the space between the front and rear vise-jaws 6 7 8 9. For this purpose the rear supplemental frame-bar is provided with an undercut at 10, extending downwardly at an inclination from front to rear of the bar, so that the sheet-blank may be thrust in by the operator at an inclination to place the rear end of the blank upon a supporting-plate 11, Fig. 4, having an upturned end 12, Fig. 2, and dotted lines, Fig. 1, secured to the right-hand side wall of the undercut, and then by releasing the front edge the blank will fall into horizontal position upon the upper surface of the front frame-bar in line with the vise-jaws. In order to accurately guide the front edge of the blank, a sheet-metal flange 13, Fig. 4, extends up from the surface of the front frame-bar and having a forwardly-flaring portion, so that the operator by simply seating the rear edge of the blank at the point where the inclined undercut wall of the frame-bar and the supporting-plate 11 converge and then dropping the front edge of the blank the said blank will fall and be guided by the flaring flange accurately into position.

As will hereinafter appear, the front and rear frame-bars are of substantially the same form and size, but they are reversed in position with respect to each other. They each comprise a fixed vise-jaw marked, respectively, 7 and 8, that marked 7 being on the front frame-bar and having its gripping-surface uppermost to coact with the upper movable vise-jaw 6 and that marked 8 being on the rear frame-bar and having its gripping-surface on its lower side to coact with the movable vise-jaw 9, this latter fixed jaw 8 being in a higher plane than the front fixed jaw 7. Each frame-bar also comprises a U-shaped portion 14, having bearing-boxes 15 16', in which the shafts of the break-arms 16 17 are journaled. There are also intermediate portions 18 19 of the frame-bars between these U-shaped portions and the fixed vise-jaws, and at these portions, as will hereinafter appear, the sheet-metal blanks are fed into the machine and are discharged therefrom, the portion 18 of the rear bar having the undercut 10, before described.

The upper movable vise-jaw 6 of the forward set of vise jaws or clamps is carried by a bracket 20, secured to and extending laterally from the rear frame-bar and having an angular flange to which the movable jaw is held by bolts 21, passing through slots 22 in the flange.

The lower movable jaw 9 at the rear of the machine is similarly carried by a bracket 23, extending laterally from the under side of the front frame-bar, each frame-bar having a lateral extension 24, to which the brackets are adjustably secured. The blank having been placed in the machine at the feeding station A is moved between the vise-jaws at the next station B to have its edge broken by a feed-slide 24', having two pairs of upwardly-extending pins 25 26, between which the blank lies when placed in the machine, it being understood that the feed-slide when at the right-hand limit of its movement is in position to act as a table to receive the blank when thrust into the machine. In order to better determine the position of the blank in relation to the pins of the feed-slide, a stop plate or guard 27 is secured to the left-hand side wall of the undercut 10 of the rear bar and extends on edge laterally of the machine, so that a guide or bearing is afforded for the operator against which he presses the left-hand end of the blank as he feeds it in and thus gages its position relative to the feed-slide. This slide has a shank 28, moving in a box 29, carried on the upper end of a standard 30, held to slide vertically by a bolt 31, passing through a slot 32 in an angle-plate 33, bolted to the main frame, said standard being guided in its vertical movements by a plate 34, secured to the lower end of the standard and having a fork 36 embracing the main cam-shaft 35, and in turn guided between a collar 37, fixed on the shaft, and a cam 38, also fixed on the shaft, the latter being adapted to give the standard its rising and falling movement by pressing upon the roller 39, journaled in the recess 40 of the standard. The slide is reciprocated by a lever 41, pivoted to the standard, its upper end engaging an opening in the slide, while its lower end has a roller 42 and is drawn against the cam-face of the cam 43 by the spring 44, connected to the lever and to the end frame.

Each time the lever moves the slide to the left from the feeding-station A the can-blank is pushed by the pins 25 in between the vise-jaws at station B in order that the breaking of the ends of the blank may be effected, and in order to allow this leftward movement of the blank the supporting-plate 11 at its left-hand side is left unattached to the side wall of the undercut 10, so that the blank will be free to pass off from this plate onto the upper faces of the lower vise-jaws 7 and 9.

The guard-plate 27 is formed with openings 45 to permit the passage of the pins 25 and 26 of the feed-slide, and the feed-slide, with its pins, it will be noticed from the transverse

sectional view, move within the space bounded by the vise-jaws. At the same time the pins 25 of the feed-slide move a fresh blank into place between the vise-jaws the forward pins 26 move the blank which has just had its edges broken out from between the vise-jaws and into position for passing through the bending-rollers. These feeding operations take place simultaneously and of course on the same stroke of the feed-slide.

As soon as the fresh blank is moved between the vise-jaws it is gripped thereby and then the feed-slide retracts to normal position, and in order to do this the standard carrying the slide lowers, through the action of the cam 38, before described, thus disengaging the pins 26 from the blank and allowing them to return below the blank as the slide is returned to the right by its lever 41 and cam 43. The lever 41 being carried on the standard 30 maintains its engagement with the feed-slide shank. The feed-slide is adapted to act as a table for receiving the blank and for holding it when in position between the vise-jaws. The blank, having been thus fed into position between the vise-jaws, is gripped by them because of the downward movement of the upper jaw 6 and the upward movement of the lower rear jaw 9, which now takes place by means of wedges 46, Fig. 3, extending between the jaws and the lips 47 of the brackets 20 23, which lips have flanges for confining the wedges. These wedges are operated longitudinally to force the movable jaws to grip the sheet-blank against the pressure of their retracting-springs 56 by rods 48, extending longitudinally of the machine from the wedges and having nuts 49, receiving the ends of rotary shafts 50, the ends of which engage the nuts by a steep thread, so that revolution of the said shafts will, through the threaded nut, move the wedges lengthwise and thus operate the movable jaws to grip the tin.

The rotary shafts work in bearings 51 on the frame-bars, being held in position by collars 52 on one side of the bearing and by pinions 53 on the other side of the bearings, through which pinions the shafts are driven from gears 54 on the shafts 55 of the break-arms 16 17. The shafts of these break-arms, as before stated, bear in the U-shaped portions of the frame-bars and extend longitudinally of the machine with the break-arms at their inner ends.

From the transverse sectional view, Fig. 3, it will be seen that the outer meeting edges of the upper and lower vise-jaws, when the same are closed, or, in other words, the points W, are axially in line with the center of rotation of the break-arm shafts, and it will be seen also that the upper and lower faces of the front and rear movable vise-jaws incline inwardly from these points, so that the edges of the blank which project laterally outside these edges of the jaws can be bent over said edges and upon the inclined faces of the mov-

able jaws, that at the front of the machine being bent upward and that at the rear being bent downward, and both bearing the same angular relation to the body of the blank. The laterally-extending edges of the can-blank as gripped by the vise-jaws lie directly upon the upper faces of the breaking-arms. These arms lie normally against the fixed jaws of the vise, so that the inner working edges thereof are coincident with the axis of the shafts carrying them, so that the working faces 57 of the break-arms revolve about this center of rotation.

The break-arms comprise steel pieces 58, removably held by screws 60 at the ends of the main portions of the arms, said steel pieces providing the breaking faces and edges of the breaking-arms. Immediately in rear of the steel pieces spring-pressed guides 61 are arranged, projecting normally up above the breaking-face of the steel piece to act as a side guide for the edge of the blank. The shanks or pins 62 of these spring-pieces work in sockets in the main parts of the arms and springs 63 press the guide-blade upward. When now the arms are turned by the revolution of their shafts, the steel pieces are turned about the center of rotation, in which the inner edges lie, and the upper faces of the steel pieces are thus carried over onto the inclined faces of the movable jaws, thus bending the metal at an angle to the main body. In this breaking or bending action of the edges of the can-bodies the guide-blades 61 yield when they contact with the outer inclined surfaces of the movable jaws. After the bending action the break-arms return to normal position alongside the fixed vise-jaws, and in order to give the break-arms this oscillating movement I employ an oscillating gear 62' at each end of the shaft 63', extending longitudinally of the machine. Each of these gears meshes with a gear 64 on the shaft of each break-arm, and said gears are oscillated through a link 64', connected with the gear and with a lever 66, pivoted to the main end frame at 65 and having an antifriction-roller bearing on the periphery of a cam 67 on the shaft 35, the latter extending lengthwise of the machine directly under the shaft 63. There is one of these cams 67 with its oscillating mechanism for the break-arms at each end of the machine, and I thus avoid torsion in the shaft 35, carrying the said cams. The same thing is true of the shaft 63. This shaft is rotated continuously by means of a gear 68 on the shaft 35 and a pinion 69 on a shaft 70, journaled in the main frame, said shaft being driven through a belt and pulley. While the breaking action is being effected the feed-slide is returning to its normal position for a fresh blank, and immediately after the edges of the blanks have been bent the break-arms move back to normal position, and as the wedges of the movable vise-jaws are operated through the described connections with the oscillating shafts of the said

break-arms they (the wedges) are retracted by this return movement of the bending mechanism and the movable vise-jaws recede from the blank by reason of the springs 56, heretofore mentioned, forcing the jaws back, said springs being arranged in the slots of the angle-brackets and bearing on the studs of bolts 21 of the said movable jaws. The feed-slide now makes its second feeding stroke to the left, pushing with its pins 26 the blank just bent from between the vise-jaws and thrusting a new blank into place by its pins 25. In this movement the first blank, with its bent edges, is moved to the third station, (marked C in Fig. 1,) and at this station it rests upon a carriage 71, having an upturned front edge to form a bearing for the end of the blank and having a dovetail 72 on its under side to hold and guide it in a groove 73, extending transversely of the front frame-bar, the said carriage being thus movable from front to rear of the machine to discharge the blank sidewise through the bending-rollers 74 75, located at the rear of the machine. This movement of the blank is at right angles to its former movements, and the arrangement provides a simple way of handling the blank and bending it up about an axial line which is parallel with its bent edges. The carriage is in a slightly-lower plane than the plane of the meeting faces of the vise-jaws, so that as the blank is pushed from between the vise-jaws it falls onto the carriage and is thus out of the way should, through accident, a second blank be fed to the carriage before the first has been discharged therefrom.

The under side of the dovetail has a rack 76 thereon, into which meshes a pinion 78, on a supplemental shaft 79, extending through the frame-bar, and having a pinion 80 at its outer end driven through an idler 81 from a gear 82 on the shaft of the front break-arm, the outer end of the shaft bearing in a bracket 83, which also carries the idler and which is secured to the U-shaped portion of the frame-bar, the said bracket having an opening through which the break-arm shaft extends. It will be seen from this that each time the break-arm turns inwardly to bend the edge of the blank the discharge-carriage will be moved toward the rear, thus thrusting the rear edge of the blank between the curling or bending rollers, and this movement is taking place simultaneously with the gripping and bending of the second blank, and when the bend mechanism returns to normal position and this second blank is discharged the carriage is back in proper position to receive the newly-bent blank from between the vise-jaws. It will thus be seen that the parts are properly timed in movement for the perfect carrying out of the work and the various actions are going on simultaneously. It will also be noticed that I utilize the oscillatory movement of the break-arm shaft to operate the vise-jaws and the transverse carriage, thus materially simplifying the mechanism and

rendering the proper timing of these parts a certainty.

The curling or bending rollers for giving the blank its proper curve may be of ordinary form having rubber peripheries which will permit the bent edges of the blanks to pass through the rollers without compressing them down flat. They are journaled in a bracket 84, secured to the rear frame-bar and are combined with an ordinary adjustable knife 85, by which the metal is curled or curved for cans of different diameters. A shield is provided above or adjacent to the upper roller for engaging the side of the blank as it curls up and thus discharging the body from the rollers and preventing the blank from coiling about the upper roller. The bight of these rollers is substantially in line with the transversely-moving carriage, so that the blank is thrust between them and their frictional contact with the blank, draws the same through, and, in connection with the knife, curls it into cylindrical form ready to have its broken edges interlocked. The curling-rollers are driven by belt 87 and pulleys 88 89 from the shaft 70, before mentioned, and through the gears 87', connecting the roller-shafts. The upper roller is carried in yielding boxes under pressure of springs 70'', and the teeth of the gears are elongated to maintain the connection between them.

It will be seen that the blank maintains the same relative position throughout all the operations with respect to the longitudinal axis of the machine, and its movements from station to station are performed in the simplest manner possible, it being only necessary to feed the sheets into the machine from the front to be discharged in the form of body-blanks at the rear.

I have adapted my machine for adjustment throughout to suit different sizes of the cans to be made. For this purpose the front and rear frame-bars are set nearer to or farther from each other, and the main or base frame 2 has a series of holes—three in this instance—to suit three sizes of cans, and the frame-bars being held at each end by bolts passing through the same and into the base-frame 2. This adjustment of the frame-bars necessitates adjustment of the movable vise-jaws toward or from the center of the machine, as the case may be, and for this purpose the brackets 20 23 carrying these jaws have three holes to correspond with the holes in the base-frame, and which receive the holding-bolts 20<sup>x</sup>, extending into the projections 24 of the frame-bars. (These holes and bolts are shown in Fig. 1.) The adjustment of the frame-bars toward or from each other alters the distance between the centers of the break-arm shafts, and this requires a vertical adjustment of the oscillating gears 62' with their shafts 63' in order to maintain the proper engagement between the gears 62' and the

gears 64 of the break-arms. For this purpose the shaft 63' bears in boxes 80, vertically adjustable in slots 81 of the main frame. These boxes consist of a rectangular portion fitted to slide between the walls of the slot and having lips 82, reaching around the outer faces of the slots, and having also an inner threaded extension 83, upon which a nut 84 is placed, so that when screwed up it will force the pins of a washer 85 on the box into openings 86 on the frame, the nut thus acting to draw the lips of the box against the outer face of the frame and to jam the washer into place, thus clamping the whole box securely. There are three pairs of these openings 86 to correspond with the adjustments above mentioned.

The gear-wheels 62' have three openings to receive the link-pins, which must also be adjusted as the gears are set up or down, the links, levers, and cams not requiring any adjustment. The vertically-movable standard 30 and the lever 41 are formed with laterally-bent portions forming a yoke or loop, through which the end of the shaft 63' extends, and this loop is of sufficient length to allow for the vertical adjustment of the shaft with the oscillating gears. The bent portion of the lever 41 is slightly longer than that of the standard in order to allow sufficient clearance in the oscillation of the lever.

I claim as my invention—

1. In combination, breaking devices, the curling-rollers, feeding means for feeding the blanks through the breaking devices, and a carrier operating at right angles to the feeding means to move the blanks transversely of the breaking means to the curling-rollers, substantially as described.

2. In combination, the front and rear rigid vise-jaws having their gripping-faces oppositely directed, the movable vise-jaws with means for moving them in opposite directions to grip the blank, one jaw of each pair having a receding inclined face and the breaking-arms with means for turning them in opposite directions about the outer meeting edges of the fixed and movable jaws to bend the edges of the blank onto the receding inclined faces, substantially as described.

3. In combination, the breaking mechanism comprising the vise-jaws with means for opening and closing the same and the break-arms with operating means therefor, and the feed-slide for feeding the blanks into the vise-jaws with means for reciprocating the feed-slide and for raising and lowering the same, substantially as described, said feed-slide moving in between the vise-jaws, to hold the blank while being clamped.

4. In combination, the breaking mechanism comprising the vise-jaws, with means for opening and closing the same and the break-arms with operating means therefor, and a feed-slide with operating means therefor, and means on the feed-slide for engaging and feeding a new blank into the vise-jaws and for

moving the previous blank therefrom, said feed-slide moving in between the vise-jaws, to hold the blank while being clamped.

5. The machine for forming can-bodies, means for breaking the ends of the blanks, a feed-slide, a vertical movable standard in which the same slides, means for operating the standard vertically and means for reciprocating the slide, substantially as described.

6. In combination in a machine for forming can-bodies, means for breaking the edges of the can-blanks, a feed-slide having pins 25, 26 feeding a pair of blanks, a vertically-movable standard in which the slide is guided, a cam for raising and lowering the same, a lever for reciprocating the slide pivoted to the standard to move therewith, and a cam for oscillating the lever, substantially as described.

7. In combination, the breaking means comprising the oscillating break-arms with their shafts, curling-rollers and a carriage for transferring the blanks from the breaking means to the curling-rollers and connections for operating the said carriage, said connections being actuated by the oscillating break-arm shafts, substantially as described.

8. In combination, the oscillating break-arm, the gripping-jaws comprising the movable member and means for operating the movable member having operating connections with the oscillating shafts of the break-arms, substantially as described.

9. In combination, the oscillating break-arms, the gripping-jaws comprising the movable members, the wedges for operating said movable members and means for moving the wedges automatically and previous to the automatic action of the break-arms, substantially as described.

10. In combination, the gripping-jaws, the oscillating break-arms, the said gripping-jaws comprising movable members, the reciprocating wedges for operating the same and the connections between the said wedges and the oscillating break-arms comprising the nut and the shaft 50 geared to the break-arm shaft, said shaft 50 being threaded to reciprocate the nut, substantially as described.

11. In combination the breaking means for the blanks, the curling-rollers, the reciprocating transfer-carriage, the oscillating break-arms, the rotary shaft geared to the break-arm shaft and the geared connection between the same and the transfer-carriage, substantially as described.

12. In combination, the breaking means comprising the gripping-jaws having movable members, the wedges for operating the same, the curling-roller, the transfer-carriage operating between the same and the gripping-jaws, the oscillating break-arms and the connections between one of said arms and the transfer-carriage and wedges for operating said parts, substantially as described.

13. In combination, the breaking means comprising the gripping-jaws and oscillating break-arms extending longitudinally of the

machine, and feed-slide operating longitudinally of the machine, curling-rollers at one side of the machine and a transfer-carriage operating transversely of the machine and at one side of the gripping-jaws.

14. In combination, the gripping-jaws and break-arms extending longitudinally of the machine, the feed-slide arranged to receive the blanks from the front of the machine, curling-rollers at the rear side of the machine and a transfer-carriage operating at one side of the gripping-jaws and from front to rear of the machine, substantially as described.

15. In combination, the gripping-jaws arranged at the center of the machine and the break-arms with means for operating the same said break-arms extending from the gripping-jaws at the center of the machine in opposite directions with their operating means at opposite ends of the machine, substantially as described.

16. In combination, the main frame, front and rear frame-bars comprising rigid gripping-jaws and laterally-extending bearing portions and the break-arms extending longitudinally of the frame-bars and having their shafts journaled in the lateral bearing portion thereof to bring their axial centers in line with the edge of the rigid clamp-jaw, substantially as described.

17. In combination, the main frame, the front and rear frame-bars extending longitudinally thereof and having rigid gripping-jaws disposed reversely in relation to each other, the movable gripping-jaws, the brackets carrying the same and secured to the frame-bars and the oscillating break-arms bearing in the frame-bars and means for operating the oscillating break-arms and the gripping-jaws, substantially as described.

18. In combination, the main frame, the front and rear frame-bars extending longitudinally thereof having rigid gripping-jaws and U-shaped bearing portions, said frame-bars being reversely disposed in relation to each other, the oscillating break-arms extending from the gripping-jaws longitudinally of the machine in opposite directions and journaled in the U-shaped parts of the frame-bars, means at opposite ends of the machine for oscillating the break-arms and means for operating the movable members of the gripping-jaws, substantially as described.

19. In combination, the main frame, the front and rear frame-bars carrying the rigid gripping-jaws, the oscillating break-arms with their shafts and with operating means, said frame-bars being adjustable toward and from each other, the movable gripper-bars and the brackets carrying the same, said brackets being adjustable on the frame-bars, substantially as described.

20. In combination, the main frame, the gripping-jaws and oscillating break-arms at front and rear adjustable toward and from each other, the gears on the break-arm shafts, the vertically-adjustable oscillating gear and

means for operating the same, substantially as described.

21. In combination, the front and rear gripping-jaws with the oscillating break-arms adjustable toward and from each other, the 5 gears on the break-arm shafts, the vertically-adjustable oscillating gears, the shaft therefor and the adjustable clamping-boxes for said shaft comprising the rectangular portion, the threaded portion, the nut and the 10 washer having pins, said washer being interposed between the nut and the end frame, substantially as described.

22. In combination, the gripping-jaws, the 15 oscillating break-arms with means for operating the same, comprising the oscillating gears, the shaft for said gears and feeding mechanism comprising the feed-slide, the ver-

tionally-movable standard with means for operating the same, the oscillating lever with 20 means for operating the same, said lever and standard having bent portions forming a loop for the passage of the operating-shaft.

23. In combination, the clamping-jaws and break-arms, a carriage to receive the blank 25 therefrom, means for moving the carriage at right angles to the first movement of the blank between the break-arms and the bending-rollers for receiving the blank from the carriage. 30

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM D. BROOKS.

Witnesses:

FELIX R. SULLIVAN,  
JAMES D. MOULTON.