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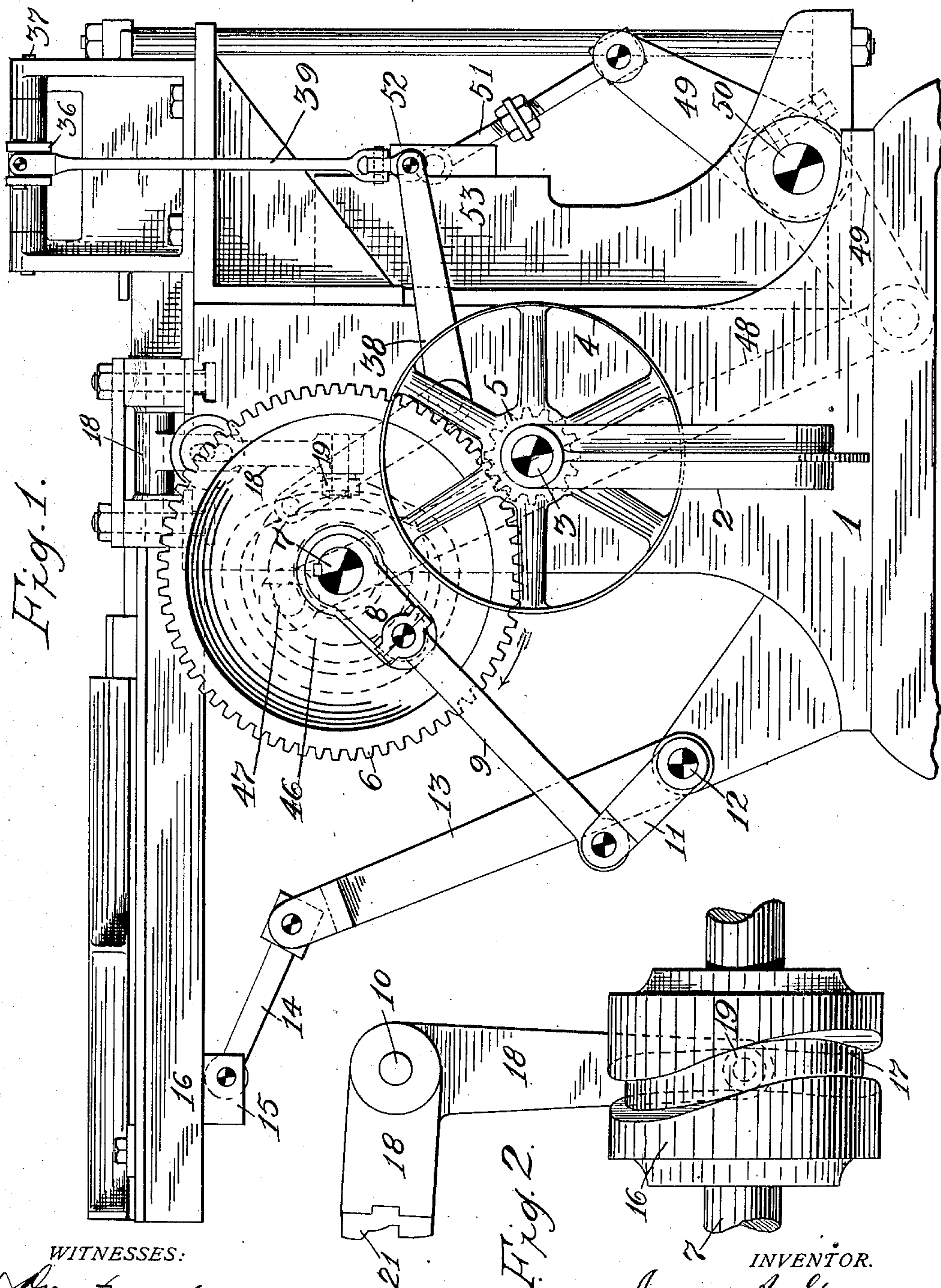
PATENTED NOV. 19, 1907.

J. A. GRAY.

CAN BODY FORMING MACHINE.

APPLICATION FILED FEB. 19, 1906.

3 SHEETS--SHEET 1.



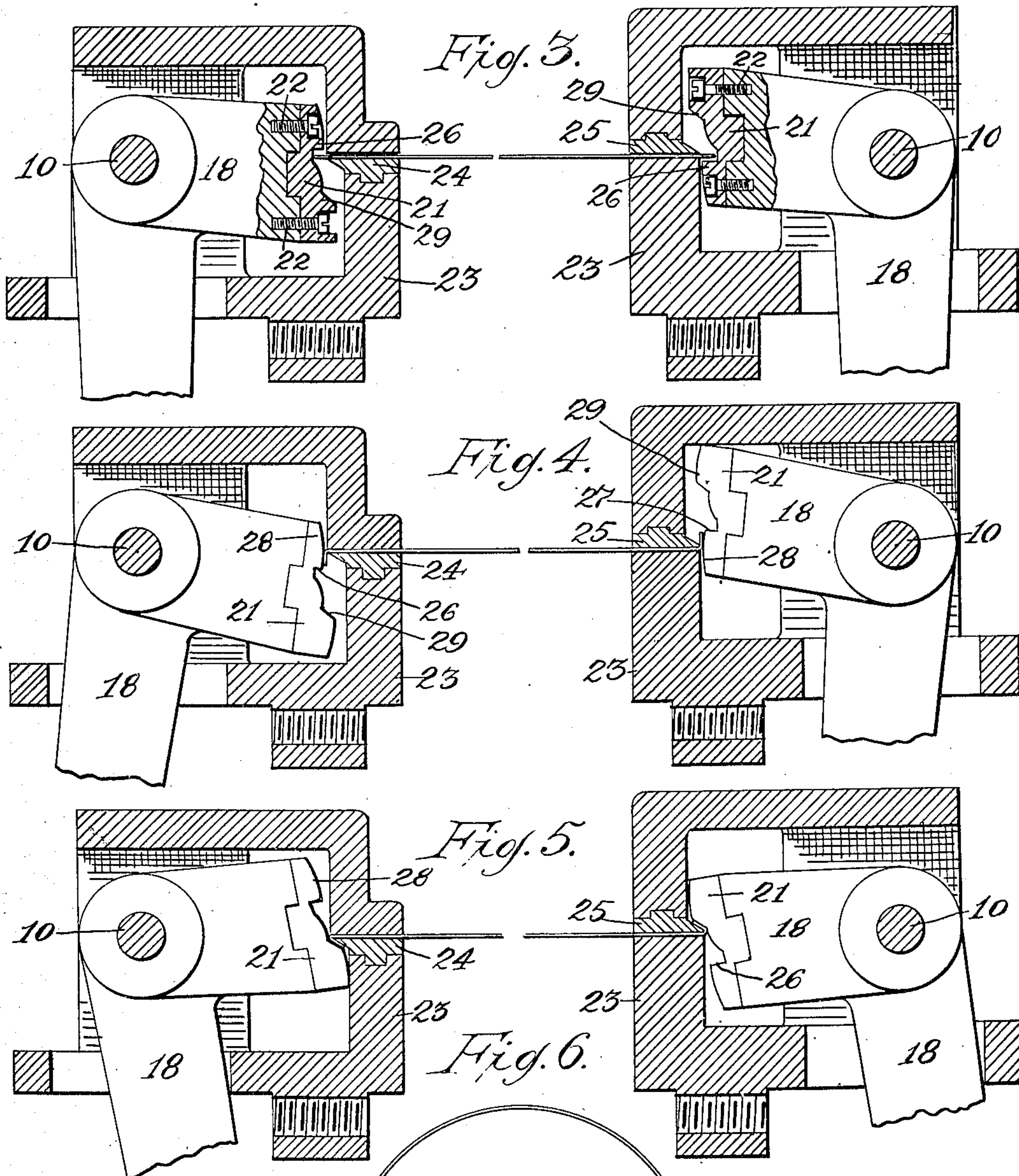
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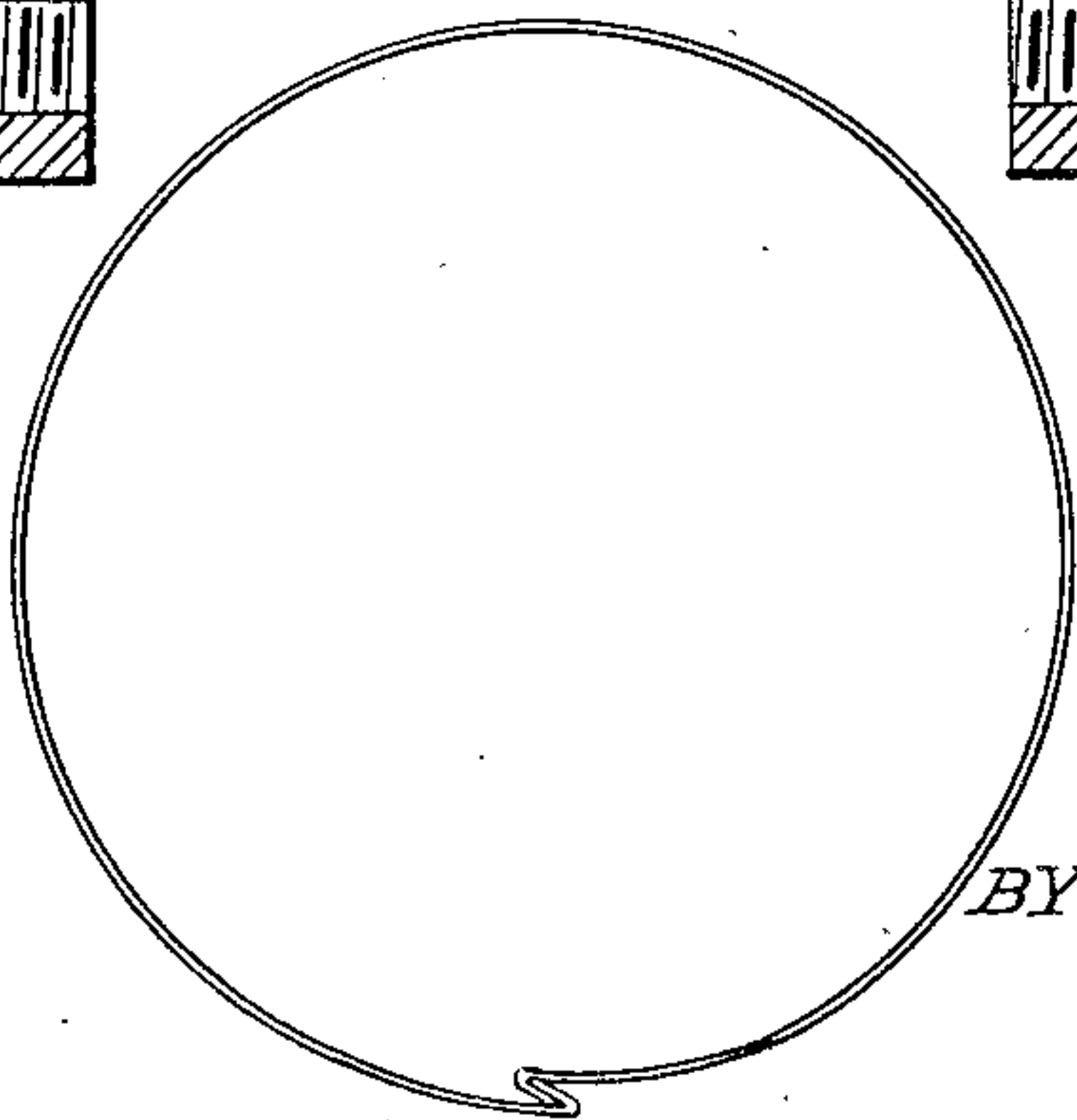
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3 SHEETS—SHEET 2.



WITNESSES:
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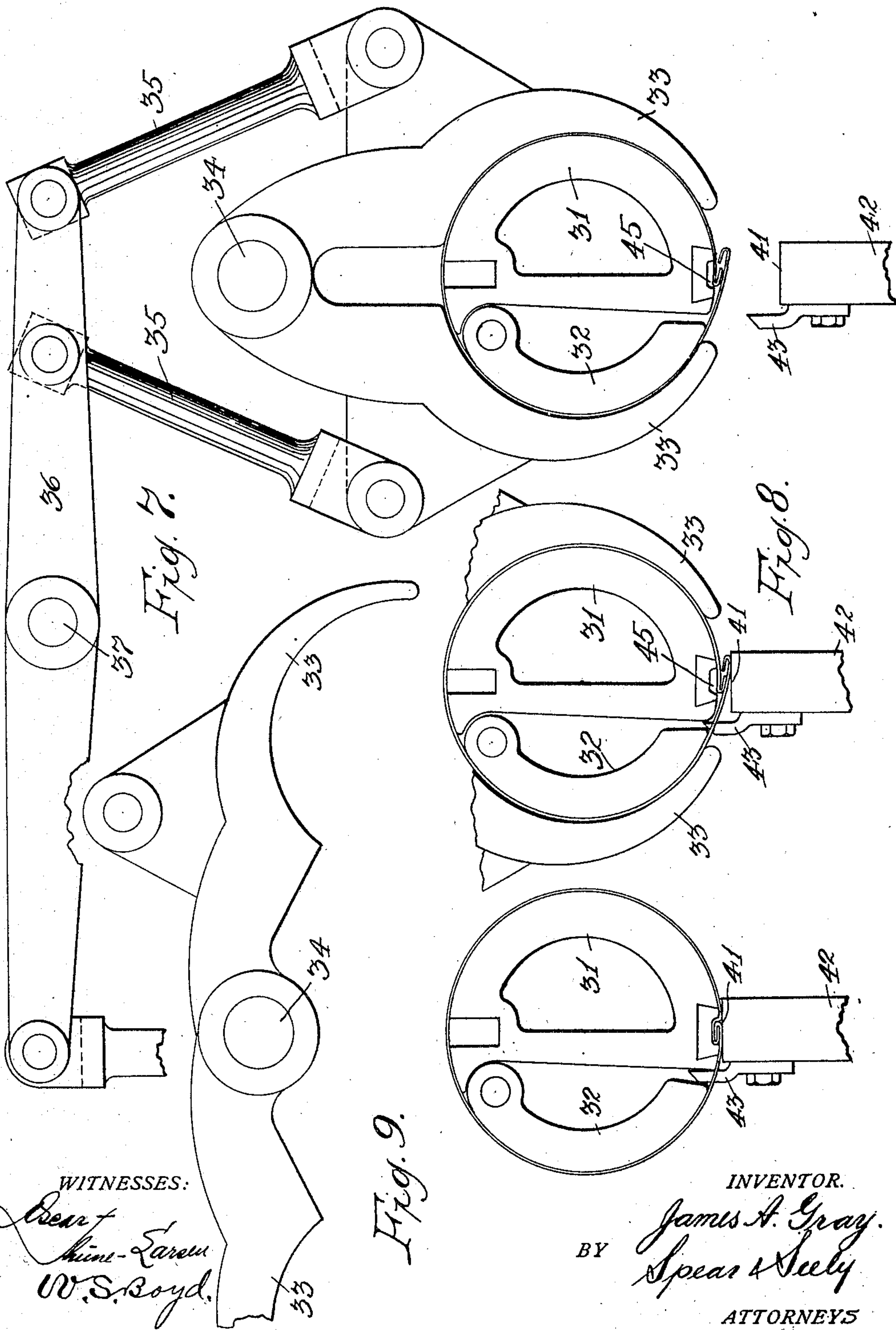
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

JAMES A. GRAY, OF SAN FRANCISCO, CALIFORNIA.

CAN-BODY-FORMING MACHINE.

No. 871,268.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed February 19, 1906. Serial No. 301,847.

To all whom it may concern:

Be it known that I, JAMES A. GRAY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Can-Body-Forming Machines, of which the following is a specification.

This invention relates to that class of machinery by means of which tubular can bodies are formed from flat blanks of sheet metal. Such can bodies, side seamed by interlocking hooks on the edges of the blanks are afterwards side-seam soldered and then headed and head-soldered, thereby becoming complete sheet-metal cans. The present invention however relates only to the making of the can-bodies proper, as the subsequent soldering and heading operations can be done in many different ways, either by separate apparatus or by connected mechanism. Any suitable side-seam soldering apparatus might be connected directly with and so form a part and continuation of the present machine; such connection with and continuation of a body former being well known in the art of can making.

The object of this invention is to simplify and cheapen the construction of body formers, to increase the rate of production, to make substantially true round can bodies and to produce a smooth neat side seam. All these objects are accomplished by a machine, an embodiment of which is shown in the accompanying drawings wherein:

Figure 1 is a side elevation of the machine: Fig. 2 is a detail view of the cam and arm for rocking one of the edge-hook forming dies: Fig. 3 is a cross section showing the position of a body blank in the hook forming part of the machine, such part not having yet operated: Fig. 4 is a similar view showing two substantially right angled bends at the edges of the blank, as the result of the first movement of the hook forming dies: Fig. 5 is a similar view showing two acute angled hooks at the edges of the blanks produced by the second or reverse movement of the forming dies: Fig. 6 is an end view of a can body with interlocked edges just previous to the bumping or flattening of such edges to form the side seam: Fig. 7 is a front elevation of the folding wings closed around the horn or mandrel upon which the body is formed: Fig. 8 is a similar view with the bumper or seam closer and mandrel ex-

pander about to operate: Fig. 9 is an elevation like Fig. 7 the mandrel having been expanded, the side seam bumped and the wings raised. This view comprises two detached mechanism, the horn bumper and expander as one, and the raised wings above.

Referring first to Fig. 1 a machine frame is shown at 1 adapted to rest upon or be secured to a floor. A part of this frame is an upturned bracket 2 in which is provided a bearing for the shaft 3 which carries the power pulley 4. I refer to this as a single pulley, considering it unnecessary to describe or show the ordinary pair of tight and loose pulleys by means of which power can be thrown on or off.

Upon the shaft 3 is a pinion 5 which engages with the spur gear 6 keyed upon the driven shaft 7. This shaft is driven constantly in the same direction indicated by the arrow. On the shaft 7 and preferably formed as a part of the spur gear 6, is a crank 8 to which is jointed the connecting rod 9. This rod is in turn jointed to the arm 11 which is fixed upon the rock-shaft 12. Consequently the arm 11 derives an oscillatory movement from the continuous rotation of shaft 7.

Fixed upon rock-shaft 12 is an arm 13, whose upper end is jointed to a link 14; and this link is in turn jointed, hinged or pivoted to the cross-head 15 which through such connected mechanism derives a horizontal reciprocation in the extension 16 of the main frame. This cross-head is connected to the blank feeding device; and as such feed forms no part of my invention and is well known to all skilled in the art, I have considered it unnecessary to illustrate it in the drawings. It is sufficient to say that the usual bars provided with depressible latches are moved back and forth by the cross head 15, so that blanks of sheet metal are fed forward step by step. On the back or reverse movement the depressible latches pass beneath the blank, which is held down by the usual upper guards and then the latch springs up and on the forward motion impels the blank into the edge hook forming mechanism. Figs. 3, 4 and 5 give progressive illustrations of the operation of this mechanism, and Fig. 2 shows how one side is operated, the operation on the other side being similar.

Upon the driven shaft 7 as shown in Fig. 2 is a disk 16 having a cam groove 17. On each side of the machine is an angular lever

18 pivoted in the main frame as shown at 10 and having at one end a roller. At the other extremities of the said angular levers are secured dies 21 preferably by means of screws 22. In the stationary casings 23, a slot is formed to receive the blank. Now referring to Fig. 3 it will be noted that on the left side of the view the edge of the blank rests upon the beveled or undercut die 24, while the other edge at the right side of the figure rests upon the casing itself and beneath the beveled or upppercut die 25. The cams 17 on both sides are so arranged and timed as to rock the levers 18 and the dies carried by them in opposite directions. Observe that in Fig. 2, the edges of the blank project into the stationary casings slightly beyond the dies 24, 25; and so, when the levers 18 are rocked, the shoulder 26, on the left comes down and the shoulder 26 on the right comes up against such projecting edges. These movements, followed immediately by the pressing action of the curved surfaces 28, gives to the edges of the blank the substantially right-angled bend shown in Fig. 4. The dies 21 on both sides are provided with the beveled ledges 29. On the reverse stroke, up on the left side as shown, and down on the right side, acute angular hooks are formed as shown in Fig. 5. These hooks are adapted to be interlocked when the cylindrical can body is made. After having its edge hooks formed the blank is carried forward to the horn or mandrel 31, upon which it is shaped or formed, and the side seam closed. In Figs. 7, 8 and 9 are shown different views of the forming horn or mandrel, and of the folding wings which give the cylindrical tubular shape to the can body. The horn can be made either solid or hollow according to the sizes of cans being made, and to commercial economy in manufacture; but in all cases such horns have a hinged expanding member 32, which when thrown out puts the can body under a tension or strain around the horn.

Referring to Fig. 6 in connection with Figs. 3, 4 and 5 it will be seen that the can body blank its edge-hooks formed has been completed. The folding wings 33 are hinged upon the pin 34 and are connected by divergent links 35 to the lever 36 pivoted upon the pin 37. As these wings fold, the can blank having its edge-hooks formed, is ready to have its side-seam flattened and closed.

On the shaft 7 or formed with the gear 6 is a bell crank lever 38 upon each side of the machine, and which operate the folding wings. These wings 33 fold downwardly upon the sheet on the mandrel, and fold the body into cylindrical form. As a part of the same operation the bumper 41 comes up and compresses and flattens the seam, thereby producing a complete can-body. The bumper or seam-closer is simply a die carried by an arm 42. The arm 42 also carries the

members 43 which, rise and expand the horn so as to put the can body upon it at that time under a tensional strain. Figs. 7 and 9 show how the bumper operates in connection with the expanders just described, and the bumper has completed its upward movement, flattening the seam into the longitudinal groove 45 in the bottom of the horn.

The means for operating the bumper are shown in Fig. 1. On the shaft 7 is a special cam having the groove 46 in which is the end roller 47 of the lever 48. This lever 48 through cranks 49 on the rock shaft 50, adjustable rod 51, and slide 52 working in the guide 53 give the proper vertical movement to the arm 42 which carries the bumper, as will be well understood by mechanics although such final connection is not shown in the drawings.

The result of the operation of the machine described, is the production of a can-body of substantially cylindrical form, with a good flat side-seam ready for soldering in case it is to be used for wet or moist goods, or capable as a seam, for being used for dry materials.

In Fig. 7 the blank has been folded by the wings but the hooks have not been engaged and the bumper and expander are inactive: In Fig. 8 the wings are still folded, the bumper has come up and is acting as a stop for the still unengaged hooks thereby making it certain that such interlocking must take place when the expander acts. In Fig. 9 the wings have risen, the expanders have thrown out the part 32 of the horn thereby pulling one hook into engagement with the other.

I do not limit myself to the precise construction and arrangements herein described and shown in the drawing, as I desire to avail myself of such modifications and equivalents as fall properly within the spirit of my invention.

What I claim is:

1. In a can body forming machine, means for supporting sheet-metal body blanks, oppositely placed oscillating dies, means for simultaneously oscillating said dies alternately in opposite directions against the blanks, and oppositely placed cooperating stationary dies; all of said dies having shaping faces arranged so that upon the first stroke of the oscillating dies in relatively opposite directions they form right-angled opposing bends at the edges of the blanks; while upon the following or return stroke they press the previously bent edges between themselves and the stationary dies, so as to form acute-angular oppositely bent edges.

2. In a can body forming machine, a support for sheet metal body blanks, two dies operated alternately in opposite directions, and having separate square and angular shoulders, and two stationary dies having angular surfaces all constructed and arranged so that the movable dies operating simulta-

neously against the exposed edges of the blank first bend the said edges to a right angle, and on the return stroke bend them to an acute angle.

5 3. In a can body former, a support for body blanks, stationary dies having respectively under cut and upper cut inclined surfaces, movable dies each having a square shoulder and an inclined shoulder, and
10 means for operating the movable dies, said movable dies being so arranged relatively to the stationary dies that oppositely disposed right angular bends are simultaneously
15 square shoulders of the movable dies, which right angular bends are changed to acute angular by the inclined shoulders of said movable dies.

20 4. In a can body forming machine, a support for body blanks, a shaft having cam disks, pivoted bell crank levers operated in opposite directions by said cam disks, a die carried by each of said levers and having a square shoulder and an inclined shoulder,

and stationary dies having respectively upper and lower inclined faces; all constructed and arranged so that the square shoulders form opposite right angular bends in the blank at the respective up and down strokes of said dies, and the angular shoulders change
30 such bends to acute angular upon the return stroke.

5. In a can body forming machine, a mandrel or horn having a hinged section, folding wings, blank feeding means and a seam
35 closer carrying one or more projecting arms; said seam closer being adapted to bear upon the adjacent edge hooks of the can body upon the horn before said projecting arms expand said horn and interlock said hooks, and then
40 to close the seam.

In testimony whereof I have affixed my signature, in presence of two witnesses, this
24th day of January 1906. /

JAMES A. GRAY.

Witnesses:

M. R. SEELY,
F. M. BARTEL.