(No Model.) 3 Sheets—Sheet 1.

# W. S. DOIG.

## MACHINERY FOR THE MANUFACTURE OF CANS.

No. 305,514. Patented Sept. 23, 1884.

*Fig. 1.*

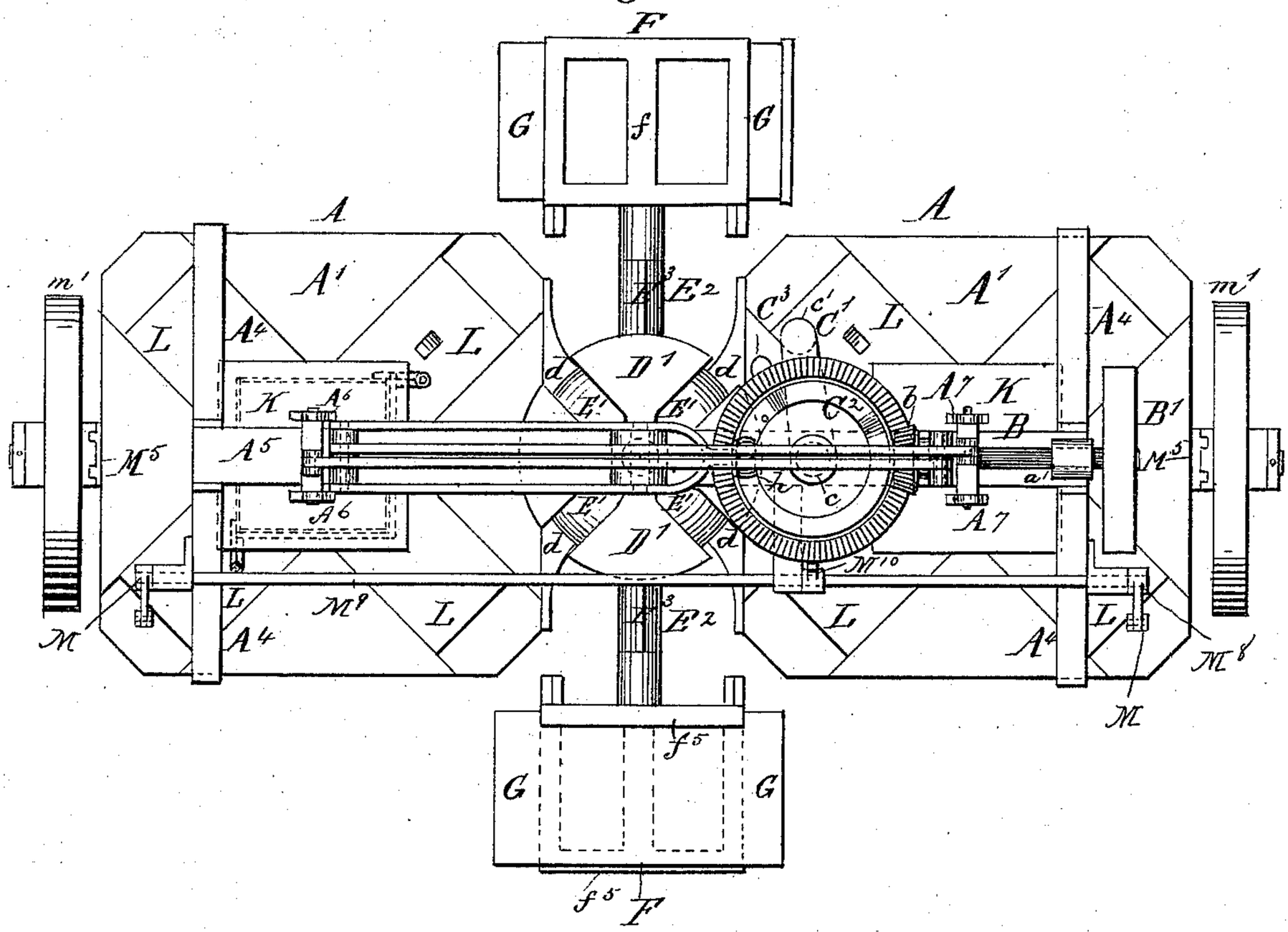
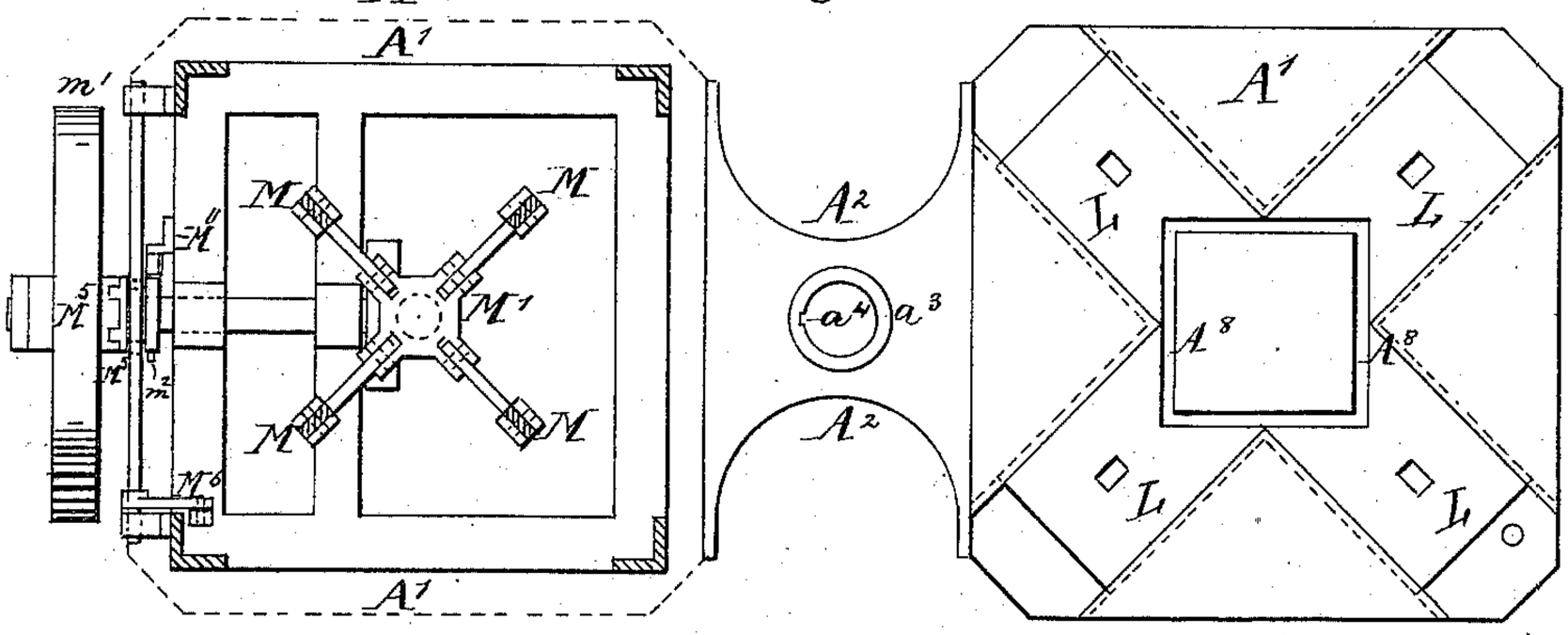



*Fig. 2.*




Witnesses:-
Geo Wadman
Geo F Bowman

Inventor:-
William S. Doig
by his Attorney
W. Colborne Brookes

(No Model.)

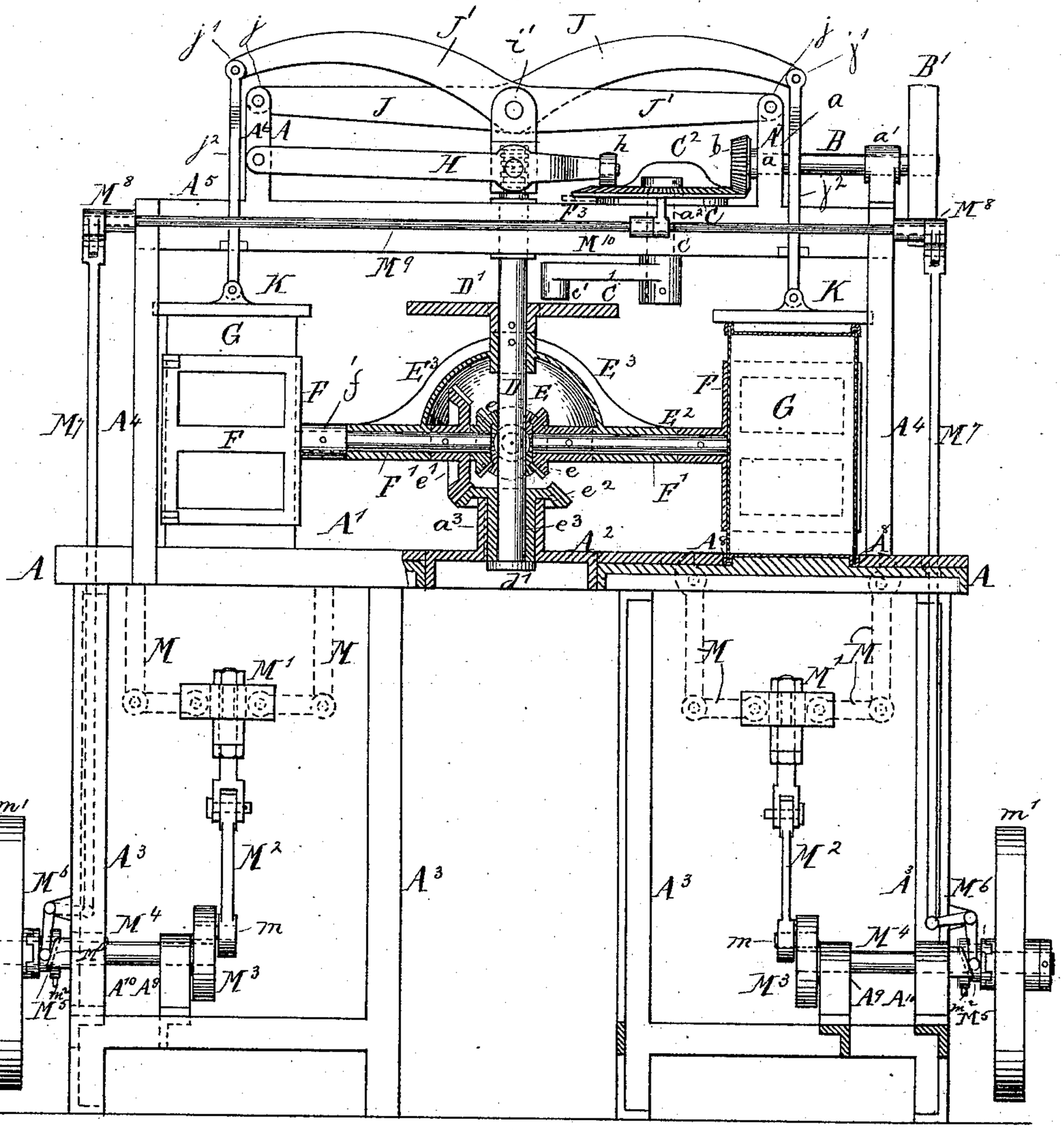
3 Sheets—Sheet 2.

# W. S. DOIG.

## MACHINERY FOR THE MANUFACTURE OF CANS.

No. 305,514. Patented Sept. 23, 1884.

*Fig. 3.*




Witnesses:-
Geo Wadman
Geo H Bowman

Inventor:-
William S. Doig
by his Attorney
W. Colborne Brookes

(No Model.) 3 Sheets—Sheet 3.

# W. S. DOIG.

## MACHINERY FOR THE MANUFACTURE OF CANS.

No. 305,514. Patented Sept. 23, 1884.

Fig. 4.

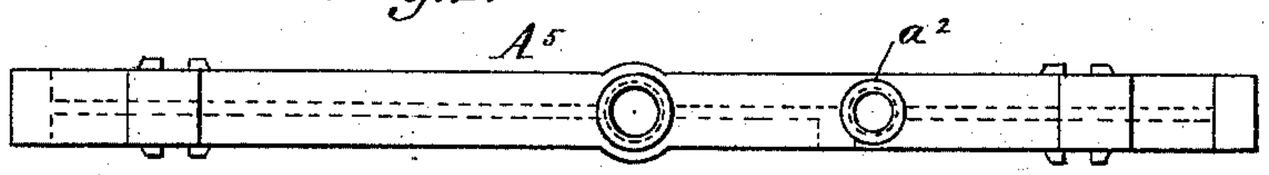



Fig 5

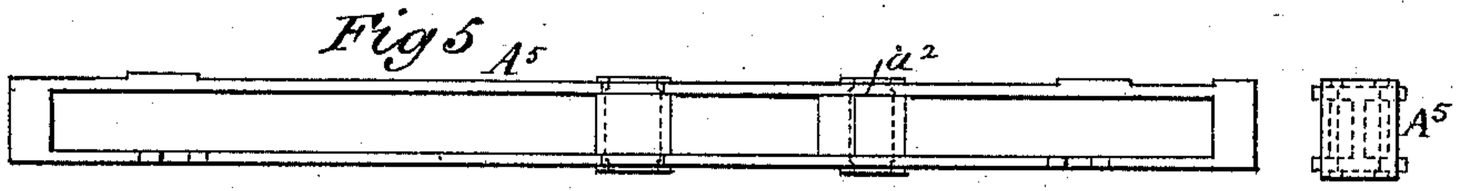



Fig. 6

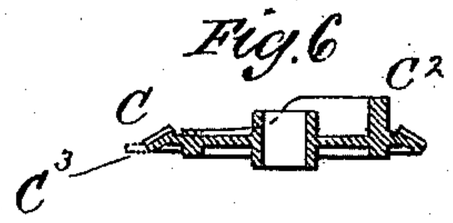



Fig. 7.

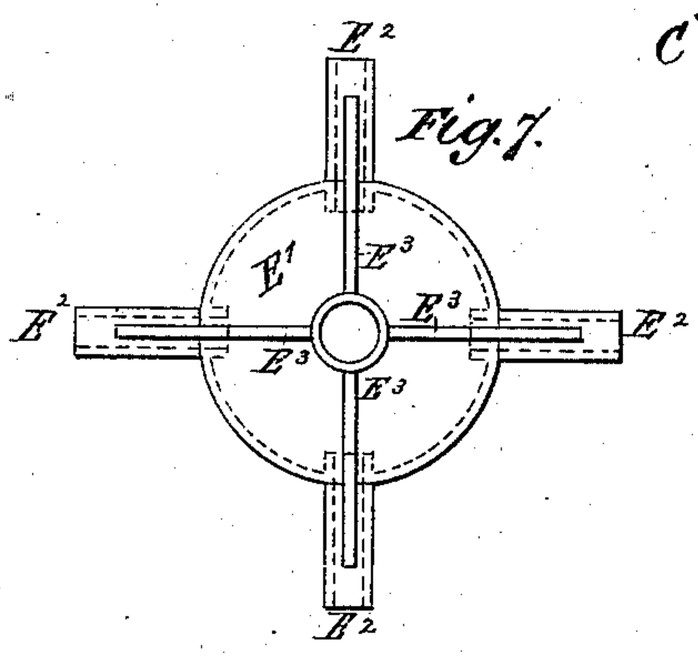
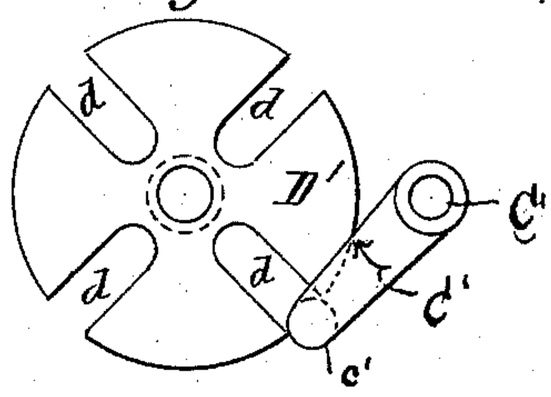



Fig. 9




d Fig. 10 d

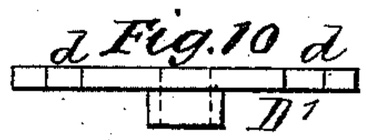



Fig. 11.


Fig. 8.

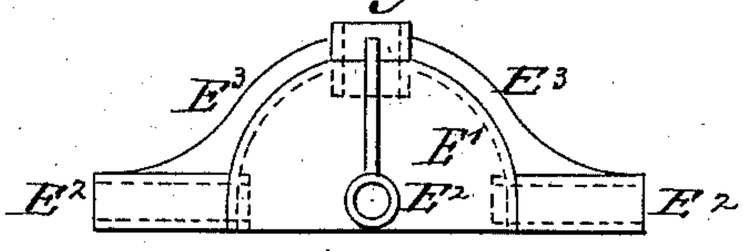



Fig. 12

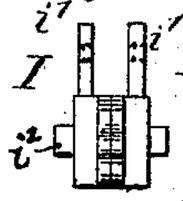



Fig. 13

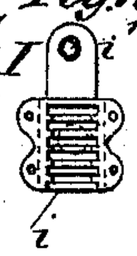



Fig. 14.

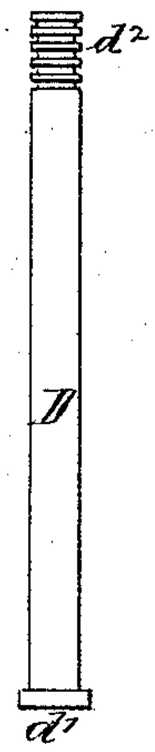



Fig. 15

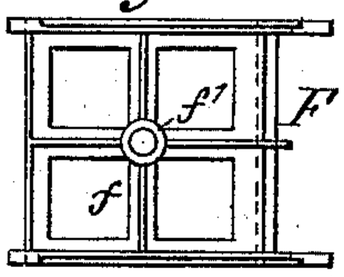



Fig. 18.

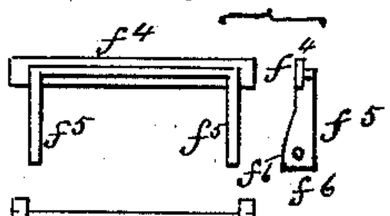



Fig. 16

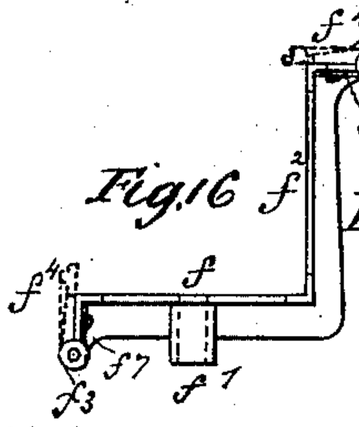



Fig. 17

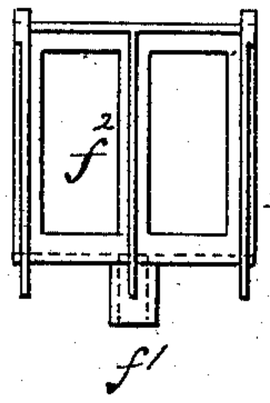
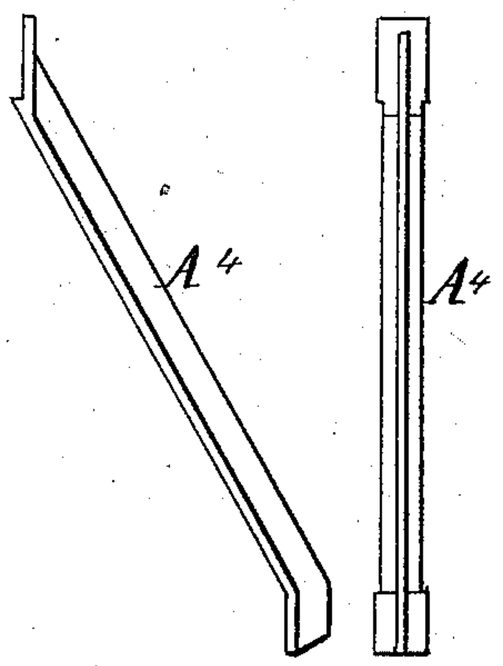



Fig. 19.




Witnesses:-
Geo Wadman
Geo H Bowman

Inventor:-
William S. Doig
by his attorney
W. Colborne Brookes

# UNITED STATES PATENT OFFICE.

WILLIAM S. DOIG, OF BROOKLYN, NEW YORK.

## MACHINERY FOR THE MANUFACTURE OF CANS.

SPECIFICATION forming part of Letters Patent No. 305,514, dated September 23, 1884.

Application filed November 3, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM SPENCER DOIG, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machinery for the Manufacture of Cans, of which the following is a specification.

My invention relates to improvements in machinery for the manufacture of cans, and it has reference, primarily, to means for receiving and holding the bodies of cans, and presenting the said bodies severally, individually, and alternately in position for the reception of their respective tops and bottoms. The apparatus is provided with a rotary shaft provided with lateral arms, each of which arms carries clamping means adapted to embrace and hold the body of a can; and the said lateral arms are so arranged that they shall be capable of being controlled by automatic mechanism in such manner that a series of can-bodies held and controlled by the said series of arms shall be each automatically, alternately, and successively placed in position, so that one shall receive a top and the other a bottom, and then by the automatic revolution of the main shaft and the turning of the lateral shafts holding the clamping means the said can-bodies shall respectively be brought into position to receive their tops or bottoms. The tops and bottoms are fed into recesses or apertures formed on the opposite ends of the apparatus provided and adapted for their reception, formed by preference in the main plate of the machine. The can-bodies are fed singly to one of the holding means, and there clamped and carried by the said holding means round into position to receive a bottom. The said body is then carried forward and revolved by its holding means and brought into position to receive its top. The can is then finished, and is relieved from its holding means, and the said holding means are again fed with another can-body, and the process is continued, continuously producing cans with tops and bottoms. I employ means for exerting pressure on plates or pushers which are operated by levers or other equivalent means for the purpose of holding the can-bodies in proper position in the holders while the tops and bottoms are being applied. I provide also means for closing in or squeezing the outer rim or edge of the grooves or sunken heads of the tops or bottoms in position to be seamed by soldering. The device is by preference supported on two separate tables connected by a bracket or brackets; but it may be with equal facility mounted on a single table similarly constructed. The jaws which form the clamping means are by preference arranged in guides or ways formed or applied in the main table or tables. These guides are controlled and operated by levers, also controlled and operated by levers actuated by an eccentric or crank supported on and revolving with a driving shaft or shafts. Upon the main shaft or shafts is mounted a disk or plate provided with four or more radial slots or openings, each of which is adapted to receive alternately a pin or friction-pulley affixed to or carried by an arm supported by a shaft or axis mounted in bearings formed in the main framing, and upon which is mounted the main gear and cam wheel, hereinafter described. To the upper end of this shaft or axis is affixed a bevel-gear, on which is formed or applied a cam or course adapted to operate the short arm of a lever, the long arm of which is connected by a peculiarly-formed socket or bearing to the main shaft, and its long arm is pivoted to a standard or bracket formed on or affixed to the main framing. In the revolution of the cam or course supported on or operating the short arm of the lifting-lever by means of a socket or bearing, motion is communicated to a pair of compound levers, one end of each of which is mounted in a bearing connected to the main framing, while to its opposite end is pivoted a link, the opposite end of which is pivoted to a plate or pusher adapted to cause the body or partially-formed can to be held in position while its top or bottom is respectively being squeezed or closed by means of the sliding jaws or clamps. The bottoms are fed in at one end of the machine, and the tops at the opposite end thereof. The lateral or radial arms are by preference supported and carried by an inverted hollow cup provided with a series of radial bearings, each provided with radial or other suitable flanges. The bearings carried by the inverted hollow cup may be cast therewith and cored or bored out so as to form bearings for the shafts supporting the holder for can-

bodies; or the said bearings may be connected thereto by bolts or rivets or by any other suitable means. Motion is by preference communicated to the apparatus by means of a driving-pulley, to which motion is also communicated by a strap or band or other driving mechanism, and this pulley is mounted on a shaft carried by a bracket supported on the main framing, on which is also mounted a bevel-gear gearing with a larger bevel-gear, on which is mounted a cam, which in its revolution is adapted to come into position to operate a lifting-lever pivoted at one end to a fixed bearing or bracket, and also by means of a truss, cup-and-ball, or other suitable bearing is pivoted to the main shaft in such manner as to allow of the free rotary motion of the main shaft therein, while at the same time the said shaft is free to be lifted or lowered in a vertical direction, so as to raise and lower the mechanism holding and controlling the position and operation of the can-holders, and consequently of the can-bodies held thereby. On the upper end of the truss or cup-and-ball bearing are formed lugs or projections adapted to form bearings for compound lever or a pair of levers adapted, according as they are moved upward or downward, to cause a corresponding motion to be imparted to the plates or pushers, by means of which pressure is exerted on the body or partially-formed can while the clamps or squeezers are being applied to close the rim or edge of the bottom or top. The apparatus is provided with duplicate series of levers, clutches, and eccentrics, which are all timed and controlled by the revolution of the main gear and cam-wheel.

The accompanying drawings form part of this specification, and illustrate what I consider the best means of carrying out my invention.

Figure 1 is a plan view of my improved apparatus. Fig. 2 is a plan view of the main plate, partly in section. Fig. 3 is a front view, partly in section, of the machine. Figs. 4 to 19 are detailed views.

Similar letters of reference are employed to indicate corresponding parts in all the figures.

A represents the main table, which, in the arrangement shown in the drawings, is formed in two halves, A′ A′, connected together by a bracket or connecting-piece, $A^2$, each half or section being supported upon a framing, $A^3$. Upon the upper side of the main table A, I mount or affix pairs of brackets or supports $A^4$ $A^4$, adapted to carry a transverse beam, $A^5$, to which are bolted or attached vertical supports or brackets $A^6$ and $A^7$, the support or bracket $A^7$ being provided with a bearing, *a*, for the reception and support of one end of the shaft B, the opposite end of which is supported with capability of revolution in a bearing, *a′*, carried by the transverse beam $A^5$.

Upon the end of the shaft B is mounted or affixed a driving-pulley, B′, which, by means of a strap, band, or other suitable operating means, receives motion from a steam-engine or other source of power. Upon the shaft B is mounted a pinion or gear-wheel, *b*, which takes into and drives a pinion or gear-wheel, C, which is mounted on a short vertical shaft, *c*, passing through a bearing, $a^2$, formed in or applied to the transverse beam $A^5$.

To the lower end of the shaft *c*, beneath the transverse beam $A^5$, is applied a crank arm or lever, C′, the forward end of which is provided with a vertical extension or friction-pulley, *c′*, adapted at each revolution of the pinion or gear-wheel C to enter into one or other of the radial slots *d*, Figs. 9 and 10, formed in a disk or plate, D′, affixed on the main vertical shaft D. The main vertical shaft D is provided with a hollow cup or casting, E′, provided with a series of radial bearings, $E^2$, each provided with a series of radial or other suitable flanges, $E^3$, adapted to give greater strength and rigidity to the bearing $E^2$, in each of which is supported a revolving lateral arm, F′, which, at its outer extremity, is provided with a clamping device, F, hereinafter more fully described, adapted to embrace and hold a cam-body, G, or other similar device. Upon the inner ends of each of the revolving lateral arms is mounted a bevel wheel or gear, *e*, the teeth or surfaces of which take into or gear with each other, motion being communicated to the series of gear-wheels *e* by means of a gear or pinion, *e′*, mounted on one of the lateral revolving arms F′, motion to which is communicated by means of a stationary bevel-gear or pinion, $e^2$, mounted on a hollow hub, $e^3$, supported in a hollow bearing, $a^3$, formed on or affixed to the connecting-piece $A^2$. The hollow bearing $a^3$ is provided with a groove or recess, $a^4$, Fig. 2, adapted to receive a feather or other equivalent connecting means formed on or affixed to the hub $e^3$. The main vertical shaft D revolves freely in the hub $e^3$, but at its lower end is provided with a collar or shoulder, *d′*, adapted to support and retain the hub $e^3$ and its gear or pinion $e^2$ correctly in relation to the gear or pinion *e′*, in whatever position the vertical shaft D may be held for the time being.

The clamps or holders F are by preference formed of a light or paneled angular frame, the part *f* of which is provided with a boss or trunnion, *f′*, adapted to be connected with the outer ends of the revolving radial arms F′. Extending from the part *f* is a light rectangular or paneled portion, $f^2$, on the outer end of which are formed bosses or bearings, $f^3$, adapted to receive the ends of a shaft or the axis upon which a clamping-plate, $f^4$, is pivoted either directly or by means of arms $f^5$, as shown more clearly by Fig. 18. The part *f* of the frame is also provided with bosses or bearings, $f^3$, adapted to receive the ends of a shaft or the axis of another clamping-plate, $f^4$, similar to the one previously described. The arms $f^5$ of the clamping-plates $f^4$ in the arrangement shown are provided

with squared faces, $f^6$ $f^6$, Figs. 16 and 18, against which a flat bearing-spring, $f^7$, operates for the purpose of holding the clamping-plates $f^4$ in an open or closed position, as desired. The object of the hinged clamping-plates $f^4$ is to allow of the said plates being turned on their axes so as to allow of the free insertion and removal of the can-bodies G, when desired, and when turned down into the position indicated by Figs. 1 and 16 to hold the can-body firmly while the same is being traversed so as to receive its top and bottom.

Upon the upper side of the pinion or gear-wheel C is formed or applied a cam-surface, $C^2$, Figs. 1 and 6, which, at every revolution of the pinion or gear C, is timed to come under the end of a lifting-lever, H, which is pivoted at its rear end to the bracket or standard $A^6$, while its forward end is by preference formed with an anti-friction wheel, *h*, adapted to roll on the upper surface of the pinion or gear-wheel C, and be raised at the proper time by the cam or projection $C^2$. The lifting-lever H is pivoted, as shown, by Figs. 1 and 2, to a truss bearing, I, (shown separately at Figs. 11, 12, and 13,) which is provided with grooves or recesses *i*, adapted to receive correspondingly-formed annular rings or projections $d^2$, formed on the upper end of the shaft D, the object of the said truss bearing being to allow of the free revolution of the shaft D, while at the same time its vertical position is controlled by the lever H.

On the upper ends of the truss bearing I are formed lugs or projections *i' i'*, adapted to form bearings for a pair of compound levers, J J, one end of each of which is respectively pivoted to the brackets or standards $A^6$ $A^7$, while their opposite ends *j'* are connected to the upper ends of links or rods $j^2$, the lower ends of which are pivoted to plates or pushers K, for the purpose of exerting pressure on the bodies or partially-formed cans G, while the clamps or squeezers L are operated to close the rim or edge of the bottom or top for the time being applied.

Each section A' of the table A is formed with a countersunk recess or aperture, $A^8$, of a proper form and configuration to receive the grooves or countersunk heads of the tops and bottoms for the time being manufactured.

In the drawings I have shown an oblong square can in the course of manufacture. I can, however, with facility adapt my invention to the manufacture of other forms of cans.

The clamps or squeezers L for each section A' of the table A are operated to and fro, when desired, by means of a series of compound levers, M M, pivoted to a bearing-piece, M', to which an up-and-down motion is communicated by means of a link, $M^2$, connected to a pin, *m*, carried by a disk or eccentric, $M^3$, mounted on the end of a shaft, $M^4$, working in bearings $A^9$ $A^{10}$, carried by the framing $A^3$.

Upon the outer end of each of the shafts $M^4$ is mounted a loose pulley, *m'*, to which motion is communicated by a strap, band, or other suitable mechanism.

$M^5$ are clutches, also mounted on the shafts $M^4$, and adapted to be thrown into position to connect the loose pulley *m'* with the shaft $M^4$ at such times as it is desired to force forward the clamps or squeezers L to close on a top and bottom. The forcing inward of the clamps or squeezers L is effected by the rotation of the shaft $M^4$, and the motion imparted thereby by means of the intermediate mechanism (above described) to the compound mechanism M M. The clutches $M^5$ are each, in the arrangement shown, actuated by a bell-crank, $M^6$, one arm of which is connected to a rod or lever, $M^7$, pivoted at its upper end to a lever, $M^8$, affixed on the end of a rock-shaft, $M^9$, on which is formed or attached an extension or bit, $M^{10}$, arranged in position to be operated at the desired time by a nose or projection, $C^3$, formed on or affixed to the pinion or gear-wheel C, the nose or projection $C^3$ being arranged in such position on the pinion or gear-wheel C in relation to the cam $C^2$ that the said nose or projection $C^3$, by the intermediate mechanism above described, shall cause the clamps or squeezers L to close upon the tops and bottoms, respectively, immediately the ends of the can-bodies are inserted into their grooves or sunken heads. The clutches $M^5$ are disengaged at the desired time from the driving-pulleys *m'* by means of studs or projections $m^2$, which in the revolution of the clutches come into contact with fixed inclined surfaces $M^{11}$, adapted to cause the clutches $M^5$ to be drawn out of contact with the driving-pulleys *m'*.

The levers J J are so arranged and constructed that they shall lift the pushers or plates K a sufficient distance after each bottom or top has been inserted not only to allow of the free lifting of the clamping devices F, but also to allow of a space being left between the top of the bodies being operated upon and the under side of the plates or pushers K.

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

1. In machinery for the manufacture of cans or similar articles, a pair or series of can-holders mounted on intermittently-revolving radial axes carried by an intermittently-revolving vertical axis, the said radial axes and the vertical axis being geared together by pinions, substantially as shown and described.

2. In machinery for the manufacture of cans or similar articles, the combination, with a pair or series of can-holders mounted on intermittently-revolving radial axes carried by an intermittently-revolving vertical axis, the said radial axes and the vertical axis being geared together, as described, of a slotted or grooved surface operated by a projection or extension from a revolving actuating means, substantially as and for the purpose described.

3. In machinery for the manufacture of cans or other similar articles, the combination of a pair or series of holders adapted to embrace a partially-formed can, and mounted on intermittently-revolving radial axes and an intermittently-revolving vertical axis, the intermittently-revolving motion of the main vertical axis and the intermittently-revolving motion of the radial axes being obtained by gearing to which intermittent motion is imparted, substantially as shown and described.

4. In combination with a device for the manufacture of cans or similar articles, a clamping or holding device, F, constructed and adapted to operate substantially as shown and described.

5. In a machine for the manufacture of cans or similar articles, the combination, with the intermittently-revolving main shaft D and a pair or series of intermittently-revolving radial shafts, F′, provided with can-holders F, and geared with the main shaft by pinions, as described, of the slotted plate D′, actuated intermittently by a revolving crank arm or lever, C′, brought into and out of position by a revolving pinion or gear-wheel, C, substantially as shown and described.

6. The combination, with the vertical axle D, geared to radial shafts carrying can-holders, and provided with a truss or similar bearing, of the lever H, and gear and cam wheel C $C^2$, substantially as and for the purpose described.

7. The combination, with the vertical axle D, geared to radial shafts carrying can-holders provided with a truss or similar bearing, a lever, H, and a gear or cam wheel, C $C^2$, of the levers J J and plates or pushers K K and their connections, substantially as and for the purpose described.

8. In machinery for the manufacture of cans or other similar articles, the combination, with the main vertical axle D, provided with a truss or other similar joint, and the sliding stationary pinion $e^2$, of a series of revolving gears mounted on radial shafts F′, and provided with can-holders F, and a series of levers for raising and lowering the main axle D and operating the plates or pushers K, substantially as shown and described.

In witness whereof I have hereunto set my hand this 20th day of October, 1883.

WILLIAM S. DOIG.

Witnesses:

W. COLBORNE BROOKES,

GEO. W. PAYNTAR.