No. 753,121. PATENTED FEB. 23, 1904.

A. C. CALKINS.

CUPEL MAKING MACHINE.

APPLICATION FILED JUNE 26, 1902. RENEWED JULY 28, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

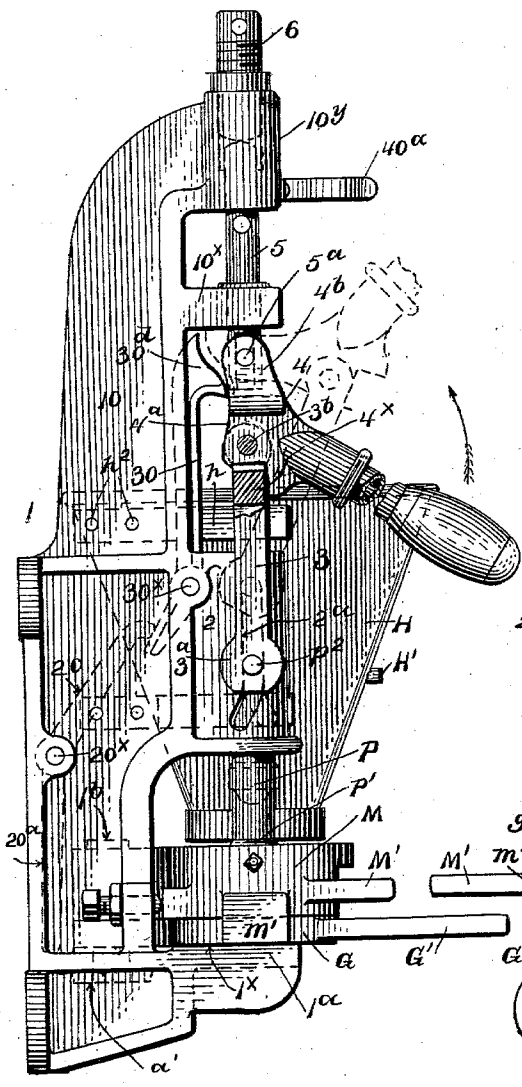
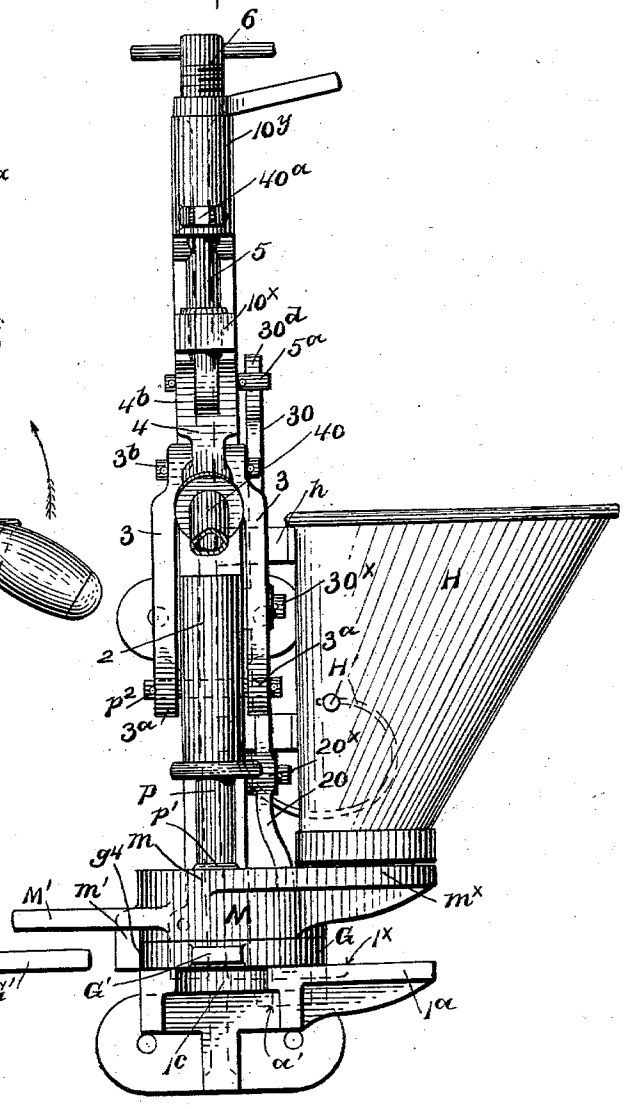



Fig. 2.




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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 4.

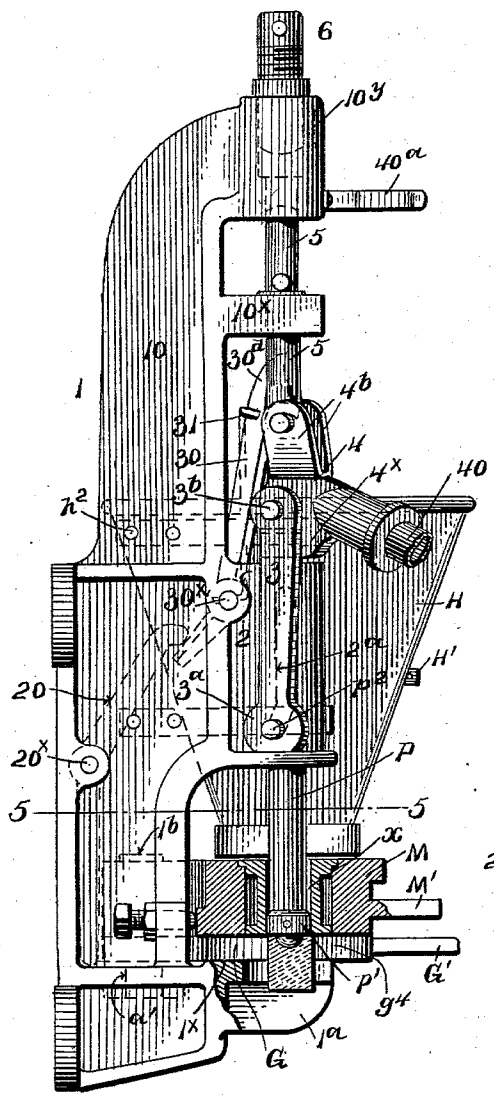



Fig. 3.

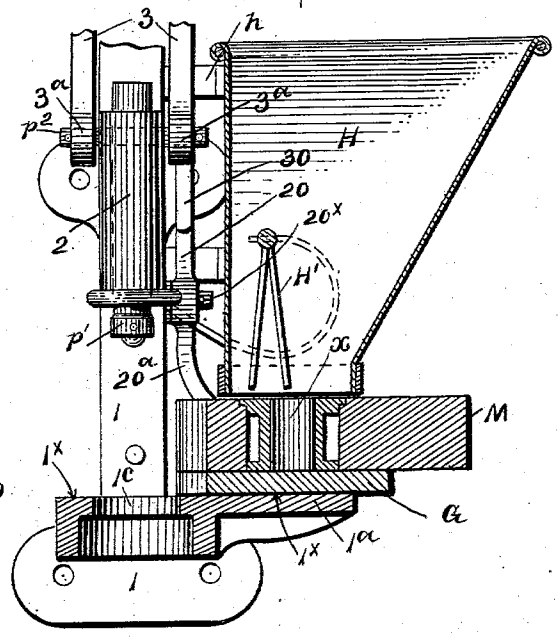
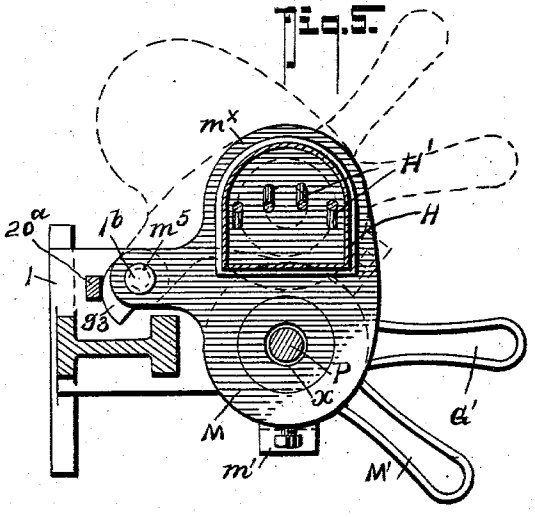



Fig. 5.




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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

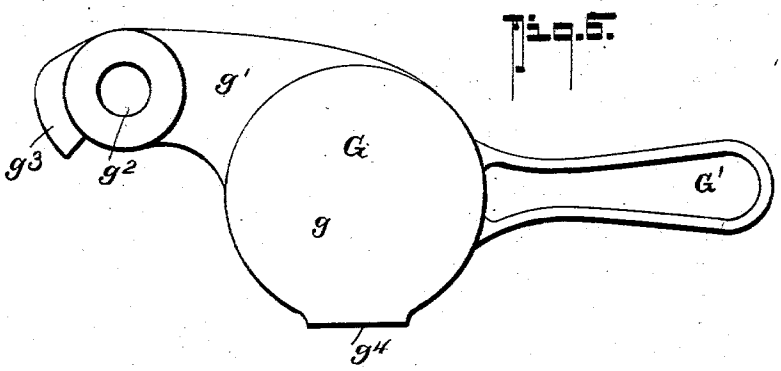



Fig. 7.

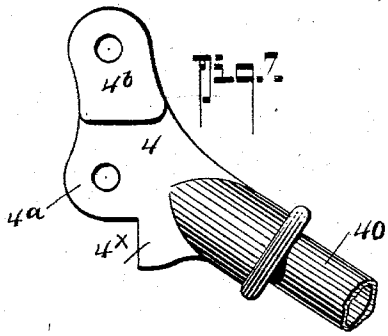



Fig. 8.

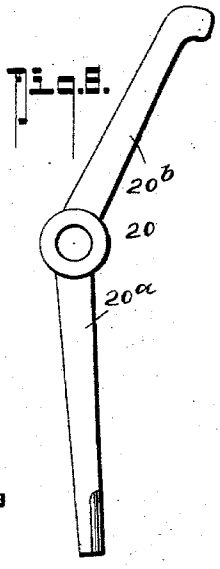



Fig. 9.

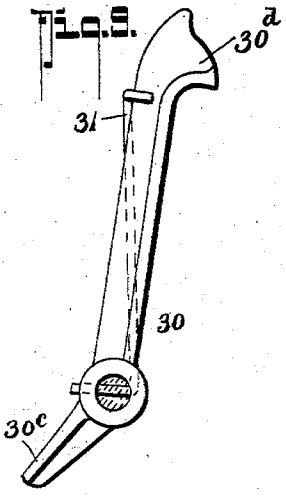



Fig. 10.

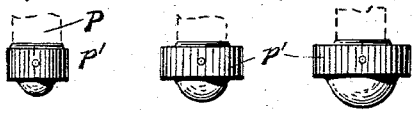
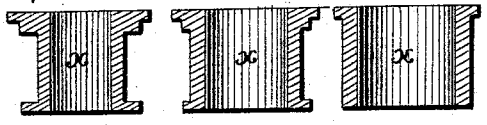



Fig. 11.




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No. 753,121. Patented February 23, 1904.

# UNITED STATES PATENT OFFICE.

ALBERT C. CALKINS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO THE CALKINS COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

## CUPEL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 753,121, dated February 23, 1904.

Application filed June 26, 1902. Renewed July 28, 1903. Serial No. 167,356. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT C. CALKINS, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Cupel-Making Machines, of which the following is a specification.

My invention is in the nature of an improved means for producing cupels used in the art of separating precious metal, gold and silver, from lead by oxidizing the lead and forming the same into litharge, which, together with the other impurities, are absorbed by the porous bone-ash, from which the cupel is made; and my present invention more specifically relates to improvements in that type of cupel-making machine disclosed in my patent dated November 14, 1899; and it primarily seeks to provide certain new coöperative arrangements and combination of parts whereby the operation of making the cupels will be more practical and economical and in which a more effective means for the cupel-body and ejecting the same from the mold is provided and which can be very conveniently manipulated.

In its generic nature my present invention comprehends a new construction of mold and gate therefor, a common toggle mechanism for compressing the cupel, and an automatically adjustable and shiftable point of resistance for the compressing-lever devices when the latter are used as an ejecting means.

In its more complete nature this invention includes a means for effecting a torsional or twist motion to the die-plunger for wiping the end of the die to free it of any material which might otherwise adhere thereto and at the same time impart a smooth finish to the cupel, which is desirable.

Again, my present invention embodies a new and novel arrangement of feed-hopper and filling means and a mold-controlling gate, and in its more subordinate features it includes certain details of construction and peculiar combination of parts, all of which will hereinafter be fully explained, and specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved machine, the plunger being shown to its down or compressing position. Fig. 2 is a front view thereof. Fig. 3 is a sectional view of the lower end of the machine including the hopper, the mold and the gate being shown under the hopper. Fig. 4 is a side view of the machine, the shiftable point of resistance or supplemental bearing for the toggle-lever being in an operative position and the plunger devices located to eject a compressed cupel, parts of the lower end of the machine being shown in section to better illustrate the operation thereof. Fig. 5 is a horizontal section taken on the line 5 5 of Fig. 4, the gate and the mold being shown under the hopper in dotted lines. Fig. 6 is a plan view of the gate. Fig. 7 is a detail view of the toggle-lever. Fig. 8 is a view of the hook-lever. Fig. 9 is a view of the ejector-hook, which has the supplemental toggle-bearing or "new point of resistance," hereinafter explained. Fig. 10 is a detail view of different sizes of dies. Fig. 11 is a similar view of different sizes of bushings.

In my present construction of cupel-making machine the main cast frame has such shape that it can be made fast to a wall or to a stand, whereby to provide a table or a wall-machine, as desired. The main frame 1 has a transversely-extending flat base $1^a$, which projects laterally from one side of the vertical or main frame, as best shown in Fig. 2, and the base $1^a$ has a bore $a'$ (see dotted line, Fig. 1,) disposed eccentrically to the vertical axis of the plunger, presently described, said bore $a'$ being arranged to receive a fulcrum-pin $1^b$, common to the horizontal swingable mold M and the gate G, the latter being held to ride over the smooth face $1^x$ of the extension $1^a$ and over the discharge passage or throat $1^c$ in the front wall of the main frame. (See Fig. 2.)

The construction of the gate G is best shown in Fig. 5, and the same consists of a solid circular plate $g$, having a tangentially-projecting arm $g'$ in the horizontal plane of the plate $g$,

which arm has an aperture $g^2$ to receive the fulcrum-pin $1^b$, and at its outer edge it has a horizontally-projecting cam $g^3$, the purpose of which will presently appear, and at its front edge it also has a solid abutment $g^4$ to coact with the pendent flange $m'$ on the mold M for reasons hereinafter also explained.

The mold M consists of a body portion $m$, having a lateral extension $m^x$, which acts as a cut-off for the bottom of the hopper when the cupel-forming cell or opening of the said mold is moved to register with the plunger-die, and the said body $m$ is also formed with a bore $m^5$ to fit the fulcrum-pin $1^b$, as shown. The mold and the gate have a superimposed relation, and the two are arranged to move in unison, and each has a projecting handhold M' G', as shown, and by providing the mold-casting with the pendent flange $m'$, as hereinbefore stated, and the gate G with the solid abutting edge to coöperate with the said flange $m'$ it follows that in returning the gate to its normal position—that is, under the plunger—the gate-abutment $g^4$ will engage the mold-flange $m'$, and thereby cause the mold to move over with the gate when it is swung to a position under the plunger, and likewise when the mold is swung under the hopper the gate will be moved with it, it being understood, however, that as the two members M and G have independent motion the gate can be moved away from the discharge end of the mold-cell during the operation of ejecting the compressed cupel.

H designates the hopper, which is removably suspended from that side of the main frame on which the gate and mold are pivotally joined, and the said hopper is held with its lower edge in a plane with the upper face of the mold M, and it has a bracket-piece $h$ provided with bolt-apertures for the fastening-bolts $h^2$ $h^2$, that secure it to the web portion 10 of the main frame, (see Fig. 1,) and to insure a positive feed of the bone-ash the hopper has an agitator H' of any approved construction.

The main frame has a vertically-extending tubular section 2 formed on its front face in a plane to the vertical axis of the cupel-discharging opening in the base of the said frame, and the said tubular section or pocket 2 is provided to guide the vertically-reciprocal plunger P, the lower end of which is threaded to receive the die $p'$, it being understood that in the practical use of my present construction of machine different sizes of dies can be attached to the plunger to coöperate with the proper-sized bushings in the mold-cell.

The tubular section or socket 2 has at opposite sides vertical slots $2^a$, the lower ends of which depart from the perpendicular and incline tangentially in opposite directions, (see Fig. 1,) the reason for which will presently appear.

The plunger P has a transverse pin $p^2$, the ends of which work in the slots $2^a$ and join with the ears $3^a$ of the toggle link or yoke 3, the upper end of which has a cross-pin $3^b$ to receive the angle-ear $4^a$ of the toggle-lever casting 4, the member $4^b$ of which is bifurcated and apertured to receive the cross-pin $5^a$ on the tail-rod 5 vertically movable in the apertured ear $10^x$ and the tubular socket $10^y$ in the top or head of the main frame and in which plays the steel adjusting-screw 6, which limits the upward thrust of the tail-rod 5. At one side the cross-pin $5^a$ extends laterally to coöperate with the supplemental or new point of resistance, presently described, when the toggle-lever devices are adjusted to act as a cupel-ejector means.

The toggle-casting 4 has a stop-shoulder $4^x$ to engage the upper end of the toggle-yoke to push the said yoke to its vertical position during the operation of compressing the cupel.

40 designates the handle and grip portion of the toggle-lever, and $40^a$ a spring-catch for holding the lever to its elevated position.

So far as described the operation of my improved machine is as follows: The mold and the gate are swung under the hopper (see dotted lines, Fig. 5) to automatically fill the cell-opening $x$ in the mold, after which the mold and the gate are swung under the plunger, the contents in the cell $x$ being retained by the gate G. It should be here stated that when the gate is moved to the last-mentioned position to act as a closure member for the cell $x$ its cam portion, hereinbefore referred to, automatically governs the lever-hook and the ejector-hook devices, which are provided to create the new or supplemental point of resistance and move said parts automatically to their inoperative position, as clearly indicated in Fig. 1 of the drawings. The filled cell $x$ being under the plunger and die, the lever 40 is then swung down, and by its action and through the toggle mechanism a direct down pressure is applied to the plunger under a powerful strain until the toggle members assume the vertical alinement shown in Fig. 1, when the direct pressure will be at its maximum and the cupel formed, and, as will be noticed, the plunger-pin at this time will be at the lower end of the perpendicular portions of the side slots $2^a$ in the socket 2. Now comes an important feature of my present invention. In my patented construction the compression-lever has two permanent fulcrum-points adapted to come into play successively on the complete downstroke of the operating-lever. In my present construction I provide a supplemental bearing or what I term "new point of resistance" for the operating-lever to effect a quick and positive operation of ejecting the cupel and at the same time wiping the die and smoothing the pressed face of the cupel. This operation is effected by a double-lever mechanism comprising two levers 20 and 30, both of

which are vertically disposed at one side of the main frame, (see Fig. 2,) the lower one, 20, being fulcrumed at $20^x$ on a stud-bolt on the side of the main frame and near its rear edge and the other on the stud-bolt $30^x$ adjacent the upper end of the socket 2. The lever 20 includes a pendent portion $20^a$, the lower end of which has one edge rounded to engage the cam $g^3$ on the gate G, and its upper end $20^b$ is bent outwardly at an angle to engage with the short rearwardly-bent angle or heel portion $30^c$ of the lever 30, whose upper end terminates in an outwardly-extending hook $30^d$, that projects toward the laterally-extended portion of the cross-pin $5^a$, with which the upper end of the toggle-head joins and which is a part of the tail-rod, as shown. The lever 30 is normally thrust, with its hook end $30^d$ toward the pin $5^a$, through the medium of the back spring device 31 (see Fig. 9) and to project in the vertical path of the movement of the pin $5^a$.

The manner in which the new point of resistance or bearing for the toggle-lever devices comes into an operative position is as follows: After the cupel is formed, which occurs when the lever devices are at the position shown in Fig. 1, the actuating-lever is swung upward a little to relieve the gate G from pressure, but not sufficient to lift the die out of the mold, and the said gate G is then swung back to uncover the cell $x$ in the mold, and in the movement thereof its cam $g^3$ disengages the lever 20 and allows the actuating-spring for the lever 30 to automatically thrust the hook end $30^d$ of the said lever 30 over the laterally-extended end of the cross-pin $5^a$, which pin, it should be stated, when the actuating-lever is swung upward in the direction indicated by the arrow brings said pin $5^a$ in a plane below the hook $30^d$. Now when the parts are thus adjusted it is obvious that when the actuating-lever is again depressed the toggle mechanism has a new point of resistance or bearing as the pin $5^a$ presses against the under side of the hook $30^d$, and by reason thereof the down thrust of the plunger will be sufficiently increased to bring the lateral studs on the plunger into engagement with the slanted portions of the slots $2^a$ in the socket 2, and thereby effect a torsional or partial rotary motion of the plunger as it pushes down against the cupel to eject it from the cell $x$, such turning of the plunger also serving to wipe off particles adhering thereto and smoothing the face of the cupel. After the cupel is discharged the gate G is brought back again under the mold, and its cam $g^2$ trips the lever 20 and causes the said lever to press against the heel of the lever 30 to bring its hook end $30^c$ out of the path of movement of the pin $5^a$, and thereby leaves the parts in position to again operate as a compressing means.

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

1. A cupel-making machine, comprising a main frame, a feed-hopper, a reciprocating plunger mounted on the main frame, a two-part mold swingable alternately under the hopper and plunger, and comprising an upper member having a vertical aperture or cell, a lower solid body that forms a false bottom for the said cell, the said upper and lower portions having interengaging members, whereby the two can be moved in unison, and means for supporting the said upper and lower members for movement independent of each other, and means for imparting a compressing movement to the plunger, as set forth.

2. In a compressing-machine as stated, a plunger, a lever joined to the plunger, said lever having a positive bearing for effecting a predetermined thrust of the plunger, and an automatically-shiftable resistance-bearing for the said lever, adapted to adjust the lever to effect a further thrust movement of the plunger, as set forth.

3. In a compressing-machine of the character described, a main frame, a plunger mounted thereon, a mold, having an aperture adapted to be set in axial alinement with the plunger, a movable bottom for the mold, a toggle mechanism including a bearing coöperating with the plunger for effecting a compression movement thereof, and an automatically-shiftable resistance bearing-point for the toggle mechanism controlled by the adjustment of the movable bottom for the mold, as set forth.

4. In a machine of the character described, the combination with the main frame, the cupel-carrying mold, said main frame having a vertical socket, said socket having oppositely-disposed slots, said slots comprising perpendicular portions and lower tangentially-directed ends, a plunger movable in the said socket, having lateral studs for moving within the slots of the socket, a yoke for straddling the socket and engaging the plunger-studs, and a toggle mechanism including an actuating-lever connected with the said yoke, substantially as shown and for the purposes described.

5. In a machine as described, the combination with the main frame, said frame including a socket 2, having oppositely-disposed vertical slots $2^a$, said slots having their lower ends deflected from a perpendicular, the tail-rod mounted in the upper end of the main frame, in axial alinement with the slotted socket, said tail-rod having a transverse fulcrum-pin at its lower end, a toggle-lever pivotally connected with the said fulcrum-pin, a plunger movable in the socket, having lateral studs engaging the slots in the socket, a yoke pivotally connected to the said studs at one end, its other end being pivotally joined with the toggle-lever, and a shiftable bearing

mounted on the main frame adapted to be swung over in the vertical path of movement of the tail-rod fulcrum-pin, all being arranged substantially as shown and described.

6. In a machine as described, the combination with the main frame, the mold M having a vertical cell extending therethrough, the gate G, said mold and gate having a common fulcrum-point and swingable in a horizontal plane, the gate having a cam member, the rocking lever 20, fulcrumed on the main frame and having a portion for engaging the cam on the gate, the socket 2, forming a part of the main frame, having oppositely-disposed vertical slots, whose lower ends deflect from a perpendicular, a tail-rod movable in the vertical axis of the socket, and having a fulcrum-pin $5^a$ at the lower end and extended laterally at one side, a plunger vertically movable in the socket of the main frame, said plunger having lateral studs for engaging the slots in the socket in which it travels, a yoke having its pendent portions pivotally connected with the said studs, a toggle-lever pivotally connected with the upper end of the yoke, and having an angle member for engaging the fulcrum $5^a$ of the tail-rod, the spring-actuating lever 30, having the hook $30^c$, and having a heel portion for engaging with the lever 20, a spring for normally forcing the hook end $30^c$, of the lever 30, over the projecting end of the fulcrum-pin $5^a$, when said pin is lowered in a plane below the said hook end, all being arranged substantially as shown and described.

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