(No Model.) 2 Sheets—Sheet 1.

J. MORHARD.

BRICK MACHINE.

No. 397,604. Patented Feb. 12, 1889.

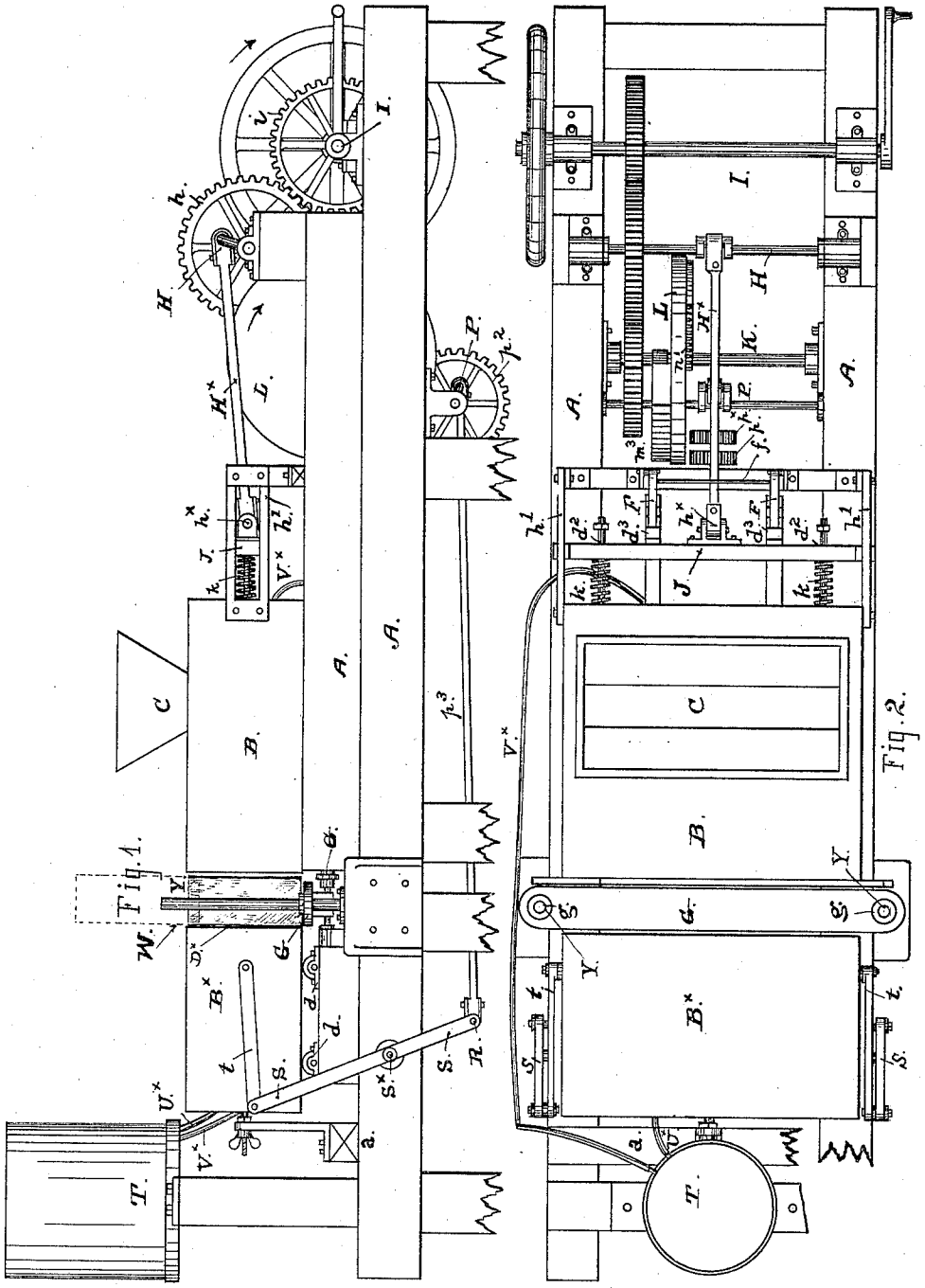

Fig. 1.

Fig. 2.

Witnesses:
R. M. Hinton.
E. Patten

Inventor:
Joseph Morhard.
By Smith & Osborn.
Atty's.

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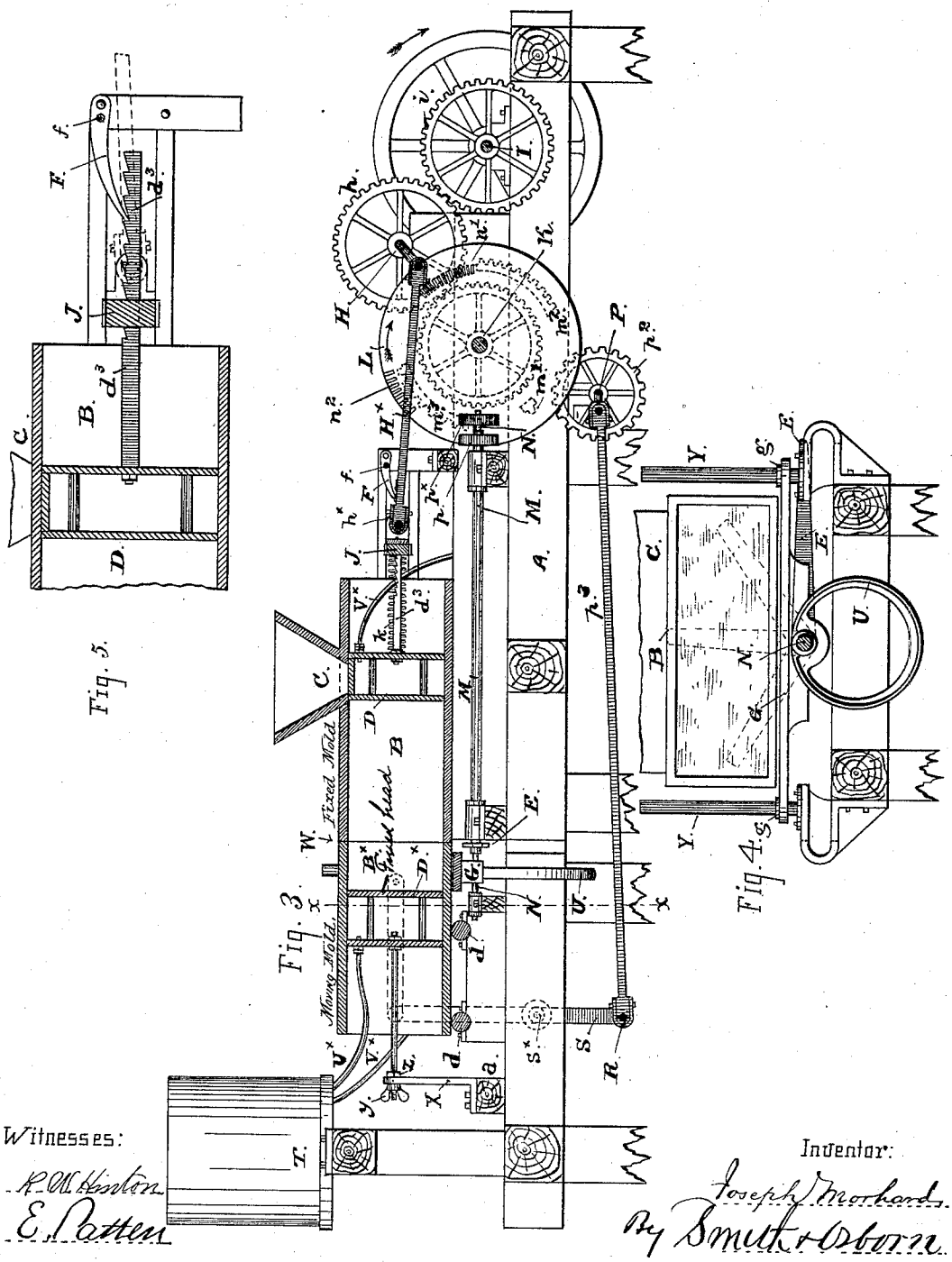

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Joseph Morhard.
By Bruce & Osborn.
Attys.

UNITED STATES PATENT OFFICE.

JOSEPH MORHARD, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO ADOLPH BETH, OF SAME PLACE.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,604, dated February 12, 1889.

Application filed July 26, 1888. Serial No. 281,125. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH MORHARD, a subject of the Queen of Great Britain, residing in the city and county of San Francisco, and State of California, have invented certain new and useful Improvements in Brick-Making Machines; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the drawings that accompany and form part of this specification.

My invention relates to improvements in machines for making bricks, tiles, and blocks for building purposes; and it consists in certain novel construction and combination of parts and mechanism, as hereinafter fully described, for pressing and cutting bricks and similar articles from a mass of clay or other suitable material, and the production of a machine in which the several operations are produced automatically and with a considerable degree of rapidity.

The following description explains the nature of my said improvements and the manner in which I proceed to construct, combine, and operate the same, the accompanying drawings being referred to therein by figures and letters.

In this improved machine the material is first subjected to suitable pressure in a two-part separable case, form, or mold, and by means of a revolving cutting-tool, which is caused to pass transversely through the pressed mass of material at the line of separation of the form or mold, at the time of such separation, after the pressing operation, a portion of the pressed material, of suitable size to form a brick or block, is smoothly cut from the end portion of the material. After this cutting operation an elevating and discharging device receives and raises the cut-off portion clear of the form and brings it into position to be readily taken out of the machine, and at such time the two-part form is moved in such manner as to uncover and leave the finished block entirely clear of the form.

The nature of my said improvements consists, therefore, in the construction and combination of pressing, cutting, and discharging mechanism, and, in connection and combination therewith, certain means of operating them in the required order and for opening and closing the form or mold.

Referring to the accompanying drawings, Figure 1 represents my improved machine in side elevation, with the lower portion of the supporting-frame broken away. Fig. 2 is a plan or top view of Fig. 1. Fig. 3 represents a side elevation in longitudinal section. Fig. 4 is a transverse section taken across the machine at the line of separation of the form or mold. This section would be in Fig. 3 at the line *x*, with the movable portion of the mold removed. Fig. 5 is a longitudinal section taken at the front end of the form or mold, to show in detail the presser-actuating rod and its connections. These two last-mentioned figures are shown on a larger scale than the other figures.

Similar letters of reference are used in the various figures to denote the same parts.

The parts of the machine are mounted on a suitable frame of timbers, A A, which may be set on wheels for convenience of moving the machine from place to place; but otherwise the frame may be set directly on the ground.

The parts B B$^{\times}$ constitute the mold or compartment in which the bricks are formed. The part B is fixed on the frame; but the part B$^{\times}$ moves longitudinally at suitable times away from the end of the fixed part and then forward into place again, for which purpose it is set on rollers *d d*. In cross-section the two parts are rectangular and of the same size, being internally of the required dimensions in height and width to give the form and size of brick or block called for. The parts B B$^{\times}$ are open at both ends, and within them are fitted the two heads D D$^{\times}$, of which the head D in the fixed part of the mold is moved back and forth by means of a crank and connecting-rod; but the head D$^{\times}$ in the sliding part B$^{\times}$ is stationary. So between the fixed head and the moving head the clay or material introduced into the mold through the opening and hopper at C is pressed and brought to shape. The joint or line of separation between the two parts of the mold is seen at W, and the fixed head D$^{\times}$ is set at

such point inside the movable part $B^{\times}$ back of this point W that the quantity of material contained in the mold between the head $D^{\times}$ and the joint W, when the pressing-head D is thrown forward to full stroke, forms the brick or block, this portion being cut off from the mass of material confined in the mold by means of a revolving blade or cutter, E, that enters from below and is made to pass with a single stroke across the mold through the line of separation at W as the part $B^{\times}$ draws back. At this point, also beneath the mold, is a vertically-moving table or board, G, on which the cut-off portion is left by the part $B^{\times}$ as it is drawn away from the fixed part B of the mold, and as this part G has suitable extent of vertical movement through the space left between the two parts of the mold when the part $B^{\times}$ is drawn back the cut-off brick is elevated above the top of the mold, and is therefore brought into position to be readily taken out of the machine.

Water is supplied through flexible pipes $U^{\times}$ $V^{\times}$ from a tank, T, on the frame to lubricate the sides of the mold and the heads D $D^{\times}$, so that the clay or material shall not adhere to the surfaces.

The crank-shaft H operates the movable head D, and has suitable length of stroke to give the necessary pressure. Spur-gears h i connect the crank-shaft with a power-shaft, I, that may be worked by hand-power through the medium of hand-cranks on the ends, or by other means, as engine or animal power, through belts and pulleys. A third shaft, K, geared into the crank-shaft, gives the required movements in time to the movable mold, the cutter, and the elevating-table or vertically-moving board G, the various movements being produced by an arrangement of broken gearing on the disk L, that is fixed on the shaft K, and the two shafts M N, carrying pinions p $p^{\times}$, and the small crank-shaft P below.

The disk L carries on one side a mutilated spur-gear, m' m^2 m^3, that engages and operates the gear p^2 in suitable manner to move the sliding part $B^{\times}$ of the mold, first, to separate the joint W sufficiently to let the cutter E pass through and cut off the formed block, and then to throw the mold entirely open for the table to rise, and, finally, to bring the part $B^{\times}$ back into place against the fixed part B. The first of these movements is produced by the single tooth m', and the others in order by the sets of broken gears m^2 m^3.

The crank P is connected by the rod p^3 to the cross-rod R, that joins together the lower ends of two levers, S S, to the upper ends of which the movable part of the mold is connected by the pivoted bars t t. The two levers S S are pivoted at $s^{\times}$ on the outside of the frame, as seen in Figs. 1 and 2. In these two views the mold is drawn back and the table is about to rise with the cut-off block. The movement of this table is given by the shaft N, that carries a pinion, $p^{\times}$, on one end to engage the crown-teeth n' on the side of the disk L, and on the other end a cam, U, that by rotation of the shaft raises and lowers the table. Another set of crown-teeth, n^2, operates the shaft M by means of the pinion p to work the cutter E. This device is fixed on the end of the shaft directly under the line of separation of the two parts of the mold and makes one complete turn or revolution to pass across the mold, and then remains at rest in horizontal position below the bottom of the mold, ready for the next stroke. In this construction and arrangement of mechanism the shaft N is carried through the shaft M in order to bring the cutter directly in the center; but it will be evident that other positions can be given—as, for instance, at one side of the mold, either above or under the mold—but such positions will require different and probably more complicated connections between the cutter and the principal operating-shaft, and therefore I have selected and applied the arrangement of shafts and gears above described in order to simplify as far as possible the operating mechanism. The elevating-table G sets directly on the cam and is guided in its movements by two upright rods, Y, that are fixed in position on the top of the frame on opposite sides of the mold and pass through holes g g in the table, near the ends thereof. Figs. 2, 3, and 4 of the drawings show this arrangement of the parts and mechanism very clearly.

By referring more particularly to Figs. 2 and 5 of the drawings it will be noticed that the movable head giving the pressure is not positively connected to the rod $H^{\times}$ of the crank-shaft; but there is a certain backward movement of the rod at the beginning of the stroke that is independent of the head, or that does not act on it, and the head is held in position forward by coil-springs for a short space of time while the crank H is drawing back. This stop-motion acts to keep the head forward against the material in the mold while the outer end portion or block is being cut and separated at the opening between the two parts B and $B^{\times}$, and at the same time the crank-shaft and connected gearing are not interrupted in their motions.

The connecting-rod is attached at $h^{\times}$ to a cross-head, J, that slides in slotted guides h', and the head D is attached to the cross-head by the rods d^2 d^2, that play through holes in the cross-head. The rods are free to slide in the cross-head, and between that part and the head D coil-springs k k are placed on the rods.

Fixed to the back of the head D are notched bars d^3 d^3, also playing loosely through the cross-head, and on the stationary part of the frame are two pivoted dogs or pawls, F F, set to engage with the notches on the top face of the bars d^3, the two pawls being connected together by the cross-bar f, that extends across the guide-frame of the traveling cross-head and over the rod $H^{\times}$ of the crank. The office

of the notched bars and the pawls is to lock the head D in position forward while the crank begins to draw back the cross-head, and it will be seen that in the continuous rotation of the crank the cross-head first compresses the springs and comes to a full bearing and pressure against the head D in a gradual manner at such time. At the end of the forward movement, also, the pawls drop into the notches of the bars d^2, and lock the head D at the point of farthest movement; but as the crank continues to draw the rod $H^\times$ in the backward movement the cross-bar *f* is struck and the pawls are thrown up clear of the notched bars. This releases the head D and the coil-springs are left free to react, by which means the head and the cross-head are restored to position ready for the next stroke.

In the construction which I have followed for the heads D and $D^\times$ two boards or plates are set parallel and secured together by spacing-bolts, to leave an open space between them, and the sides and top and bottom are left open also, excepting in the moving head D, where the top is closed in order to prevent the clay from dropping into the head when moving under the hopper. Connection of the space in each head with the water-tank T is made by the tubes $U^\times$ $V^\times$, as before described, so that the heads are kept supplied with water when in operation to lubricate the surfaces inside the mold.

The fixed head $D^\times$ is held by the standard X, that is bolted to the cross-bar *a* of the frame, behind the movable part of the mold, and the rod which holds the head is screw-threaded and passes through the upper end of the standard, where it is fixed by nuts *y z*. This allows the head to be set either forward or backward a greater or less distance with respect to the line of separation between the two parts of the mold, and thus to regulate and vary the thickness of the brick to be made.

In the operation of the machine the clay, previously prepared for the purpose, is supplied through the hopper when the movable head is drawn back, and the opposite head being properly set for the thickness of brick to be made, the machine is set in motion. The material is then forced into that part of the mold beyond the line of separation W and becomes pressed to suitable density, and at the same time brought to shape by the movement forward of the head worked by the crank-shaft. At the end of this operation the mold is separated at the joint sufficiently to admit the cutter, and that portion of the pressed material lying between the fixed head and the line of separation is cut off. The movable part of the mold then draws back and the table rises with the cut-off block on it. The finished blocks are taken from the elevating-table by an attendant as fast as presented and placed on trays or carriers, ready for the drying or burning processes.

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

1. A machine for molding bricks, building-blocks, and like articles, having a two-part separable mold, of which one part is fixed and has a moving head or presser and the other part is movable and has a fixed head, as described, a cutting device adapted to work between the said two parts when separated to cut off that portion of material lying between the line of separation and the said fixed head, a movable table or elevating device adapted to receive and raise the cut-off portion clear of the mold, and mechanism, substantially as described, in combination therewith, to operate the movable part of the mold, the cutter, and the table with respect to one another, as set forth.

2. In a brick-molding machine, the combination of the two-part mold having one part fixed with a movable head or plunger in it and an opening for the introduction of the material, and the other part movable and separable from the said fixed part with a fixed head set therein, a cutting device placed for operation at the line of separation of the said parts and adapted to work between them when separated, an elevating-table also placed for operation at the same point to pass between the said parts when separated, and mechanism whereby the said plunger, movable part of the mold, cutter, and elevating-table are operated with respect to one another and in time, as set forth.

3. In combination with the plunger or movable head, the stop device consisting, essentially, of the cross-head having connection with the crank-shaft, the rods, springs, notched bars, pawls, and connecting-rod, applied for operation substantially as described.

4. In combination with the fixed part B and the movable head D working therein, the movable part $B^\times$, and the fixed head $D^\times$, which is adjustable therein, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

JOSEPH MORHARD. [L. S.]

Witnesses:
A. BETH,
W. L. CURTIN.