

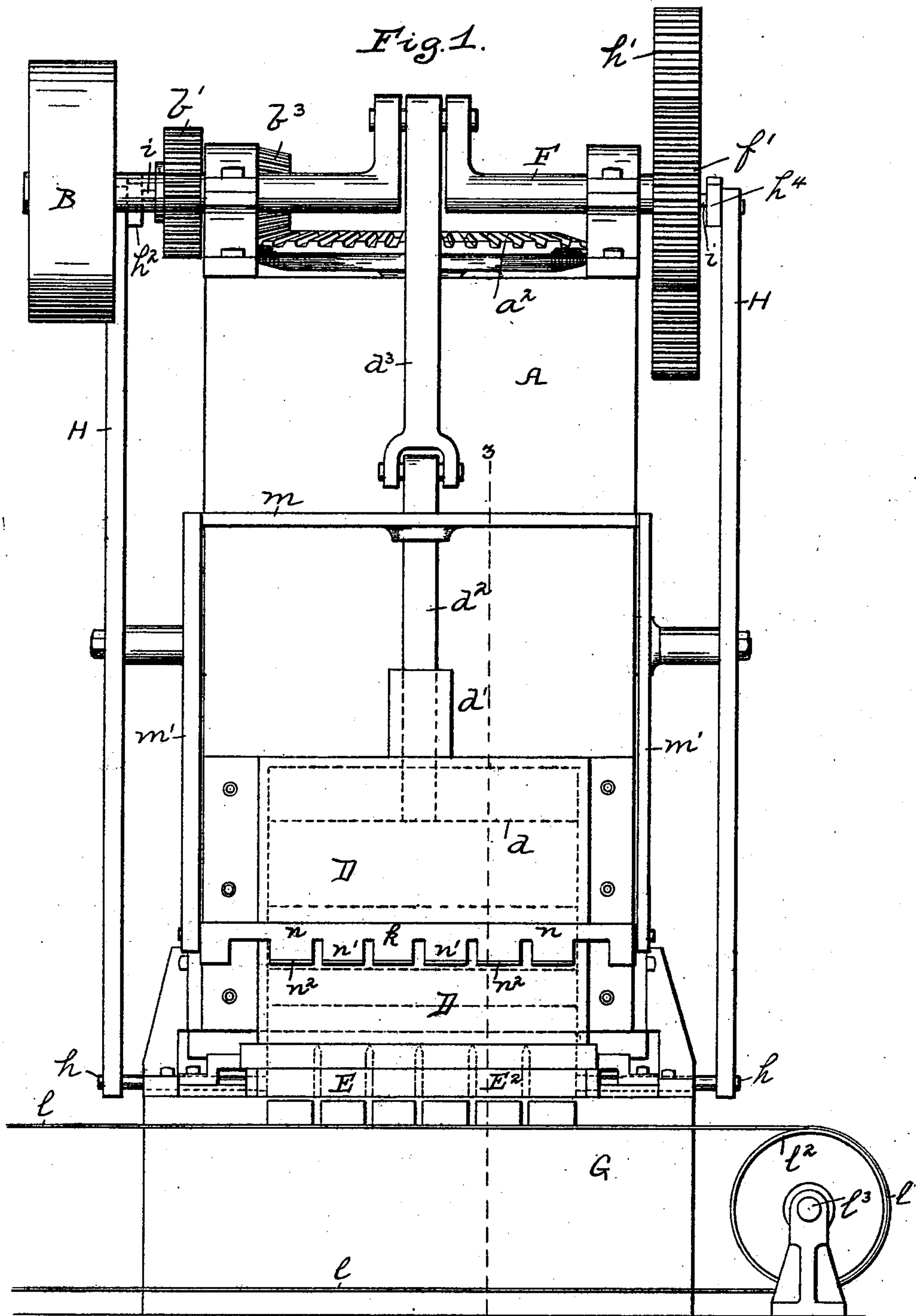
(No Model.)

3 Sheets—Sheet 1.

W. ZORTMAN & G. R. WARD.
BRICK MACHINE.

No. 516,883.

Patented Mar. 20, 1894.



Witnesses:
D. L. Dorsey.
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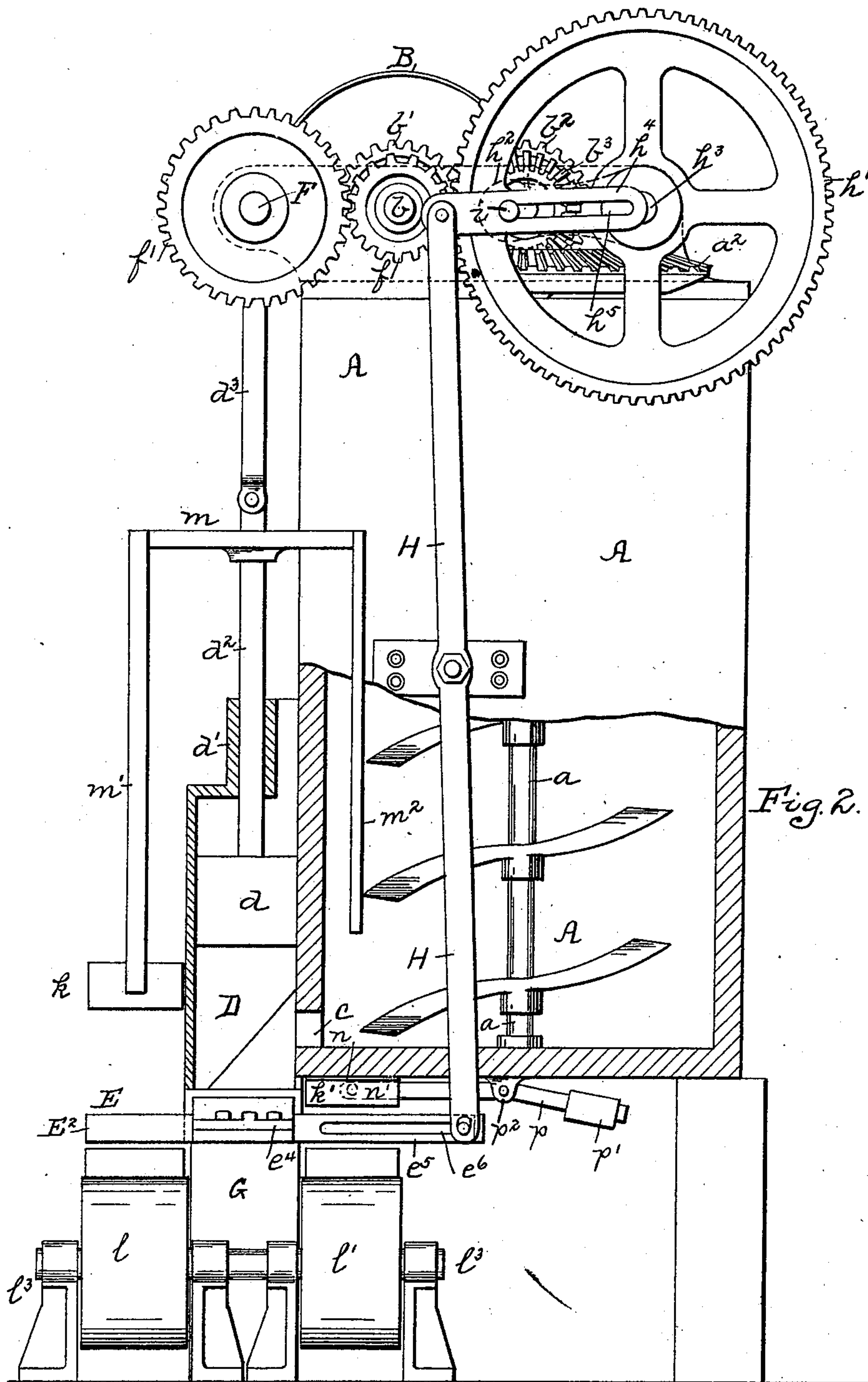
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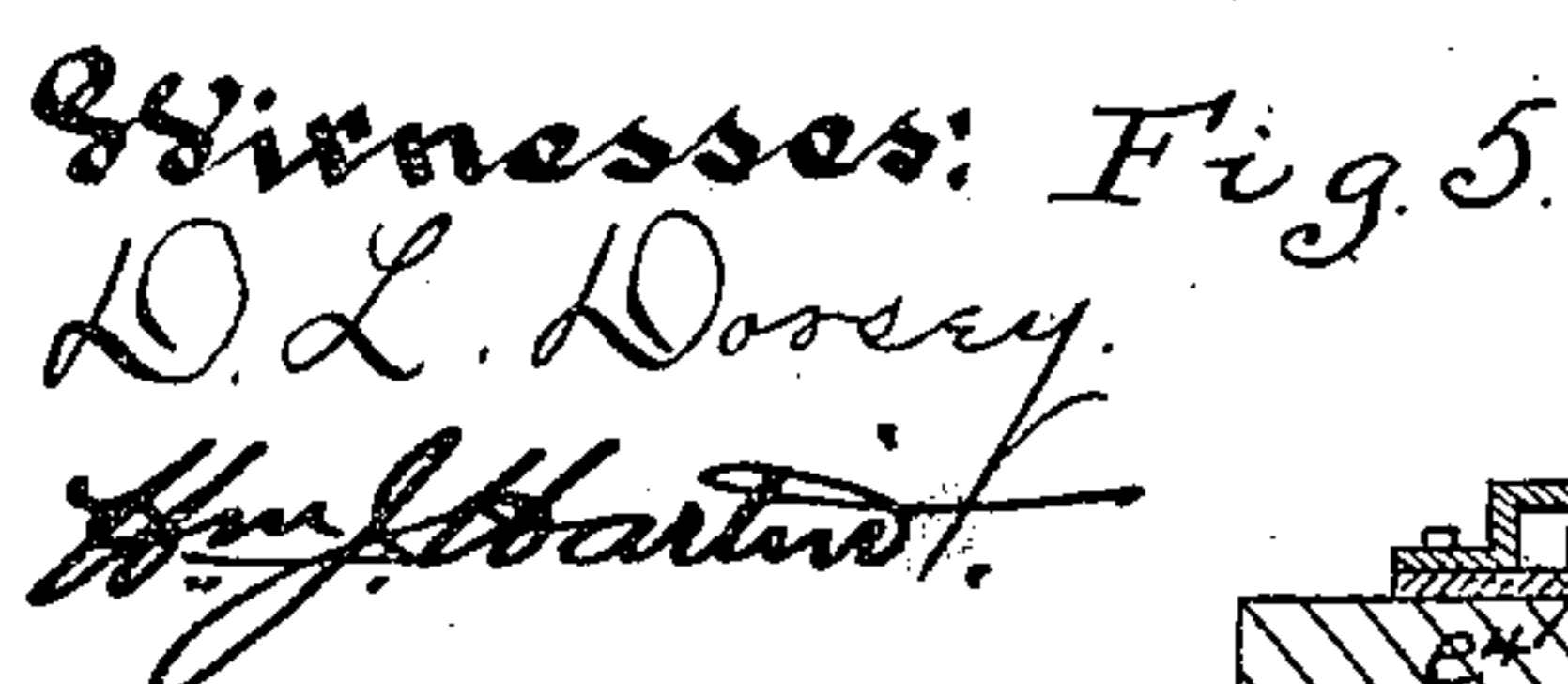


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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

WILLIAM ZORTMAN, OF ALLEGHENY, AND GEORGE R. WARD, OF PITTSBURG,
ASSIGNORS OF ONE-THIRD TO CHARLES A. BALPH, OF PITTSBURG, PENN-
SYLVANIA.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 516,883, dated March 20, 1894.

Application filed April 29, 1893. Serial No. 472,349. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM ZORTMAN, a resident of Allegheny, and GEORGE R. WARD, a resident of Pittsburg, in the county of Allegheny, State of Pennsylvania, have invented a new and useful Improvement in Brick-Machines; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to brick machines, its object being to improve these machines in such way that the bricks can be easily discharged from the machine and carried forward and delivered at a point where they can be easily handled, a further object being to provide for the more rapid operation of the machine, as instead of the necessity of feeding the molds by hand to the machine the molds are operated automatically and the bricks discharged therefrom automatically, so rendering it possible to run the machine at a much higher speed.

To these ends our invention comprises, generally stated, a brick machine having a pug mill and a brick press to which the clay is fed from the mill, said press having a vertical reciprocating plunger in combination with a bottomless mold into which the clay is forced by the plunger or pusher to push the bricks from the mold; the mold being reciprocated horizontally and it being preferred that the mold shall have two sets of mold cavities so that while the bricks are being formed and pressed in one set, the completed bricks may be discharged by a pusher from the other set of mold cavities.

To enable others skilled in the art to make and use our invention, we will describe the same more fully, referring to the accompanying drawings in which—

Figure 1 is a face view of a brick machine embodying the invention. Fig. 2 is a side view thereof, part of the wall being broken away to illustrate the machine. Fig. 3 is a vertical section on the line 3—3, Fig. 1. Fig. 4 is a horizontal section on the line 4—4, Fig. 3. Fig. 5 is a detail section of the press on the line 5—5, Fig. 3, and Figs. 6 and 7 are views of the bottomless mold.

Like letters of reference indicate like parts in each of the views.

In the brick machine embodying our invention, the general arrangement as to the position of the main elements can be, of course, varied as desired, the pug mill being either vertical or horizontal and feeding at any proper point into the press.

In the drawings the pug mill A is shown as vertical, the stirrer shaft *a* with its arms being driven by suitable gearing, the power being applied to the shaft *b* through the pulley B and by the gears *b'* *b*² to the shaft carrying the beveled gear *b*³ which meshes with the large beveled gear *a*² at the upper end of the shaft *a*. The pug mill has the discharge opening *c* which communicates with the press D, the press shown being of sufficient length to form six bricks, but being made of any suitable length according to the size and number of the bricks to be formed. The press D has the vertically reciprocating pressing plunger *d* which moves through the bearing *d'* at the upper end of the press and corresponds in shape to the press, the plunger *d* being adapted when it descends to close the discharge opening *c* of the pug mill. This plunger *d* is connected by its piston rod *d*² to the pitman *d*³ which engages with a crank shaft F, said crank shaft being driven from the power shaft *b* by means of the pinions *f* *f'*. The base of the press D is formed corresponding to the shape of the bricks to be formed, and is divided by the ribs *c'* which ribs have their upper ends beveled or pointed so as to cut the clay as it is forced down by the pressing plunger *d* and direct it into the mold cavities *e* of the mold E, the mold E traveling over the mold block G which forms the bottom to the mold cavities, these mold cavities being formed bottomless so that the bricks can be discharged vertically therefrom. The base block G corresponds in width to the length of the brick to be formed, and as the mold is reciprocated it is carried beyond this base block and can thus be brought into such position that the bricks can be discharged therefrom. The base block G forms a proper foundation for the press D, and also aids in supporting the pug mill. The construction of the mold E is shown in Figs. 6 and 7, as well as in other views, the mold itself being what might be

termed skeleton in form and having, in the preferred construction, two rows of mold cavities e which are divided by the longitudinal rib e^2 and cross ribs e^3 to correspond in thickness to the thickness of the bricks to be formed, and it is mounted in suitable guides e^4 so that one or the other series of mold cavities, for example, the series of mold cavities E' and the series of mold cavities E^2 , can be brought under the press and drawn from under the same. Any suitable means for reciprocating this mold can be employed, that shown being long levers H which connect with the bars h of the mold, said bars extending through slots e^6 in the guides e^5 in which said mold moves, and the levers H carrying the mold into one or the other position, bringing one or the other of the series of mold cavities under the press. For the purpose of operating the said levers, we have shown the gear wheel h' on one side of the machine which gears with the pinion f above referred to and has the crank pin i thereon, and the crank arm h^2 on the other side, which is mounted on the shaft h^3 carrying the gear wheel h' so that the crank arm h^2 , and crank wheel h' operate together. The crank arm and crank wheel are each connected to the levers H by the link bars h^4 having slots h^5 in which the crank pins of the crank arm and crank wheel enter and travel, sliding in such slots until it is desired to impart the required motion to the mold, when they engage with one or the other end of said slots and through the levers impart the necessary motion to the mold.

In the construction of the machine shown, there is the single press D with the double mold E , and in order to discharge the bricks from the double mold, we employ the two reciprocating pushers k k' which are adapted to force the bricks from the mold cavities as one or the other series of mold cavities is carried to one or the other side of the press, the bricks being discharged upon the traveling belts l l' , respectively, which are mounted on suitable pulleys, as, for example, the pulleys l^2 mounted in the bearings l^3 . These belts are driven by any suitable means at a proper speed to carry the series of bricks formed at one operation a sufficient distance so as to leave a clear surface upon the belt for the next series of bricks to be discharged thereon, and, if desired, the belt may be operated intermittently. The belt may be employed to receive the bricks directly or may be arranged to carry suitable boards or trays upon which the bricks may be discharged and by which they may be carried by the workmen out upon the floor for drying. The pusher k is carried by the frame m which is connected to the piston rod d^2 and has the arms m' rigid therewith, which extend down to and are connected to the pusher k , the pusher thus reciprocating with the press and a sufficient distance below the same so that it will enter the mold E and force the bricks from the series of mold cavities E^2 thereof. The pusher k ,

as shown in Fig. 1, is formed of a plate or bar n having a series of blocks n' depending therefrom and corresponding in size and shape to the mold cavities E of the mold, so that the blocks n' will enter the said mold cavities and discharge the bricks. The lower ends of such blocks n' are shod with rubber or like yielding shoes n^2 so as to act to discharge the bricks without marring their form. The pusher k' is in the press shown arranged under the pug mill A , and its construction is therefore changed somewhat, the construction as illustrated in the drawings being the following:— Said pusher is formed of the like plate n and blocks n' depending therefrom, the plate n resting against the bottom of the pug mill which forms the stop for the same, and the pusher being mounted on the levers p carrying weights p' and mounted in the bearings p^2 so that the pusher is always held above the mold when it is drawn to that side of the machine in position for the discharge of the bricks therefrom. In order to force the pusher k' down into the mold cavities and discharge the bricks therefrom, we mount on the frame m the arms or vertical bars m^2 which extend down on each side of the body A of the pug mill and strike against the pusher k' where it extends beyond the pug mill and so force it down into the mold to discharge the bricks therefrom, the bars m^2 rising with the pressing plunger and the blocks of the pusher k' being lifted out of the mold cavities by the weight p' at the end of the lever p , so acting first to discharge the bricks and then to rise from the mold to permit its horizontal reciprocation.

The operation of the machine in forming bricks may be briefly described as follows: The parts are geared to move at the proper relative speed, this including the belts l l' on which the bricks are carried from the machine, and as soon as the clay has been properly worked in the pug mill the discharge opening c is opened and by the operation of the pug mill the clay is forced into the press D . One set of mold cavities in the bottomless mold E , such as, for example, the set E' is brought under the press and as the press descends it forces the clay down through the base of the press into the mold cavities e and that series of mold cavities is thus properly filled. In its reciprocation the plunger d closes the discharge opening c of the pug mill and descends farther so that it approaches the ribs c' at the base of the press. As soon as the bricks are in this way formed within the mold, the mold itself is drawn over by the levers, the base of the press acting in connection with the ribs of the mold to cut off the bricks to the proper thickness, and the series of bricks being in this way drawn under the discharge pusher k' , and at the same time the series of molds E^2 being brought under the press D so as to receive the next series of bricks formed. Meanwhile, the plunger d has risen and the clay is fed by the pug

mill through the opening c into the press, and as the press again descends it will force the clay into the mold cavities e in the series E^2 so as to form the bricks therein. At the same time, the bars m^2 will descend with the plunger and strike against the pusher k' , forcing its pushing blocks n' into the mold cavities e of the series E' and forcing the bricks therefrom which are thus discharged by the pusher k' upon the traveling belt or carrier l' . As soon as the plunger d again ascends the pusher k' is raised by the weight p' , and the lever H then forces the mold E over into its first position bringing the series of molds E' under the press and the series of molds E^2 under the pusher k , and when said pusher k descends in the next downward movement of the plunger d , its pushing blocks n' enter the mold cavities e of the series of molds E and force the bricks formed therein down upon the traveling belt l , so discharging the bricks. This operation is repeated and at each stroke of the plunger d a series of bricks is formed in the mold, and a series discharged therefrom, the result being that the bricks can be formed very rapidly, and that as they are formed they are carried away from the machine to such position that the workmen can take them up and carry them upon the floor for drying, while at the same time, as they are carried out in two different lines, the machine can be run much more rapidly and the workmen can have a better opportunity to receive and carry the bricks from the traveling belts.

Another very important advantage of the invention is found in the fact that the clay can be worked much stiffer than in the ordinary machine, and that the bricks can be compressed so as to be much more perfect in shape, because that they are properly formed in a bottomless matrix and are discharged through the bottomless matrix at the end opposite to that at which the clay is received, the result being necessarily the more perfect formation of the corners of the bricks. At the same time, positive pushing means is provided for discharging the bricks from the mold cavities; instead of the ordinary dumping over of the closed mold, the bricks can be made much more solid and compact and subjected to a greater pressing action within the press, the clay can be employed in a stiffer condition, the bricks can be made easily and rapidly dried, and, indeed, in some cases may be placed within the kiln without drying.

The mold is reciprocated in the following way: The gear wheel h' is turned by the pinion f , and the crank arm h^2 is rotated by said wheel through the shaft h^3 , both swing together, the crank pins i sliding along in the connecting link bars h^4 which swing upon the upper ends of the lever H until the crank pins i reach the ends of the slots h^5 of the connecting links h^4 and either draw or push over the said links, imparting the motion to the mold at the opposite end of the levers. As

soon as the wheel and crank arm have each made a half revolution, the crank pins i travel in the opposite directions in the slots of the connecting links, the mold at the opposite end of the lever H remaining stationary while the crank pins are traveling in said slots, and during this time the bricks are being pressed into the mold and the bricks being discharged from the mold, as above described, the mold being at rest until the crank pins reach the opposite ends of the slots h^5 , when they will press over the connecting links and through them the levers and so bring the molds to the opposite position, this operation being repeated for each stroke of the mold, and the machine being properly geared and timed for the operation above referred to. The crank pins i can be made adjustable on the gear wheel or crank arm, respectively, in order to give the exact stroke required.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a brick machine, the combination of a pug mill, a brick press having a vertically reciprocating plunger, a horizontally reciprocating bottomless mold into which the clay may be forced by the plunger, and a vertically reciprocating pusher to push the bricks from the mold, substantially as set forth.

2. In a brick machine, the combination of a pug mill, a brick press having a vertically reciprocating plunger, a horizontally reciprocating bottomless mold containing two series of mold cavities, and a vertically reciprocating pusher to push the bricks from the mold, one series of the mold cavities resting under the pressing plunger to receive the clay, and the other under the pusher so that the bricks can be discharged therefrom, substantially as and for the purposes set forth.

3. In a brick machine, the combination of a pug mill, a brick press having a base block, and a vertically reciprocating plunger, and a horizontally reciprocating bottomless mold traveling over the base block and adapted to receive the clay from the press, substantially as and for the purposes set forth.

4. In a brick machine, the combination of a pug mill, a brick press having a vertically reciprocating plunger and a base block, and a horizontally reciprocating bottomless mold into which the clay is forced by the plunger, a vertically reciprocating pusher to push the bricks from the mold, and a traveling belt below the pusher to receive the bricks discharged from the mold, substantially as set forth.

5. In a brick machine, the combination of a pug mill, a brick press having a base block and a vertically reciprocating plunger, said press having a series of ribs extending across the base thereof to form compartments corresponding in size to the bricks to be formed, and a horizontally reciprocating bottomless mold having ribs dividing the same into mold cavities which correspond to the ribs at the base of the press, substantially as set forth.

6. In a brick machine, the combination of a

pug mill, a brick press having a base block and a vertically reciprocating pressing plunger, a horizontally reciprocating bottomless mold having two series of mold cavities therein and two vertically reciprocating pushers, one arranged on each side of the mold, each acting to push the bricks from the series of mold cavities exposed on that side of the press when the other series is within the press, substantially as and for the purposes set forth.

7. In a brick machine, the combination of a pug mill, a brick press having a base block and a vertically reciprocating pressing plunger, a horizontally reciprocating bottomless mold having two series of mold cavities therein and two vertically reciprocating pushers, one arranged on each side of the mold, each acting to push the bricks from the series of mold cavities exposed on that side of the press when the other series is within the press, and two traveling belts underneath the pushers to receive the bricks discharged from the mold, substantially as and for the purposes set forth.

8. In a brick machine, the combination of a pug mill, a brick press having a vertically reciprocating pressing plunger, a frame connected to said plunger, said frame carrying a pusher, and a horizontally reciprocating bottomless mold having two series of mold cavities therein, one series being under the press to receive the clay, while the other is under the pusher so that by the down stroke of the press the one series is filled and the bricks are discharged from the other series, substantially as set forth.

9. In a brick machine, the combination of a pug mill, a brick press having a vertically reciprocating pressing plunger, a pusher mounted under the pug mill and supported in a raised position, and a reciprocating bar separate from the pusher and adapted to contact with the same and force it into one series of mold cavities to discharge the bricks therefrom, substantially as set forth.

10. In a brick machine, the combination of a

pug mill, a brick press having a vertically reciprocating pressing plunger, a pusher fitting under the pug mill and supported on a weighted lever or like device so as to be held normally in a raised position, and a frame carried by the plunger and having a bar separate from the pusher and adapted to contact with the same and force it into the series of mold cavities to discharge the bricks therefrom, substantially as and for the purposes set forth.

11. In a brick machine, the combination of the pug mill, the vertically reciprocating plunger, the guide-ways *e*⁴ having slots formed therein, the horizontally reciprocating mold fitting in said guides and provided with pins extending through the slots of the guides, and the levers H connected to said pins, substantially as and for the purposes set forth.

12. In a brick machine, the combination of a pug mill, a brick press having a base block, a vertically reciprocating pressing plunger, a horizontally reciprocating bottomless mold into which the clay is forced by the plunger, and a vertically reciprocating pusher to push the bricks from the mold, said pusher having pushing blocks provided with yielding surfaces, substantially as and for the purposes set forth.

13. In a brick machine, the combination of a pug mill, a brick press, a mold mounted in guide-ways, and adapted to be reciprocated under the press, one or more levers connected to said mold and carrying at the upper end thereof a link bar having a slot therein, and a crank engaging with such link bar by a pin entering said slot, substantially as and for the purposes set forth.

In testimony whereof we, the said WILLIAM ZORTMAN and GEORGE R. WARD, have hereunto set our hands.

WILLIAM ZORTMAN.
GEORGE R. WARD.

Witnesses:

J. N. COOKE,
WM. J. HARTIN.