

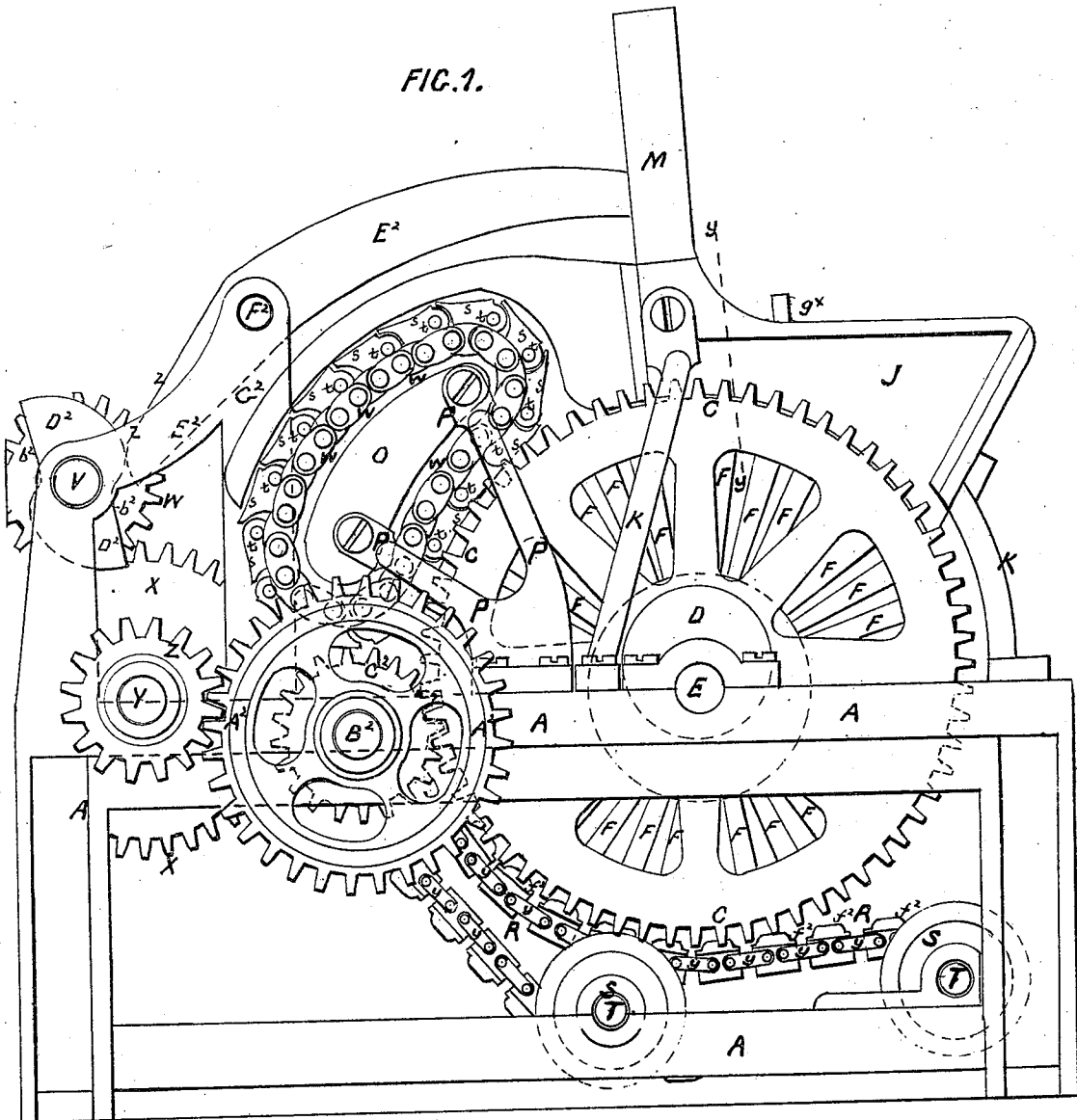
M. M. PETTES.

MACHINE FOR MAKING COAL-DUST, &c., INTO BLOCKS.

No. 170,587.

Patented Nov. 30, 1875.

FIG. 1.



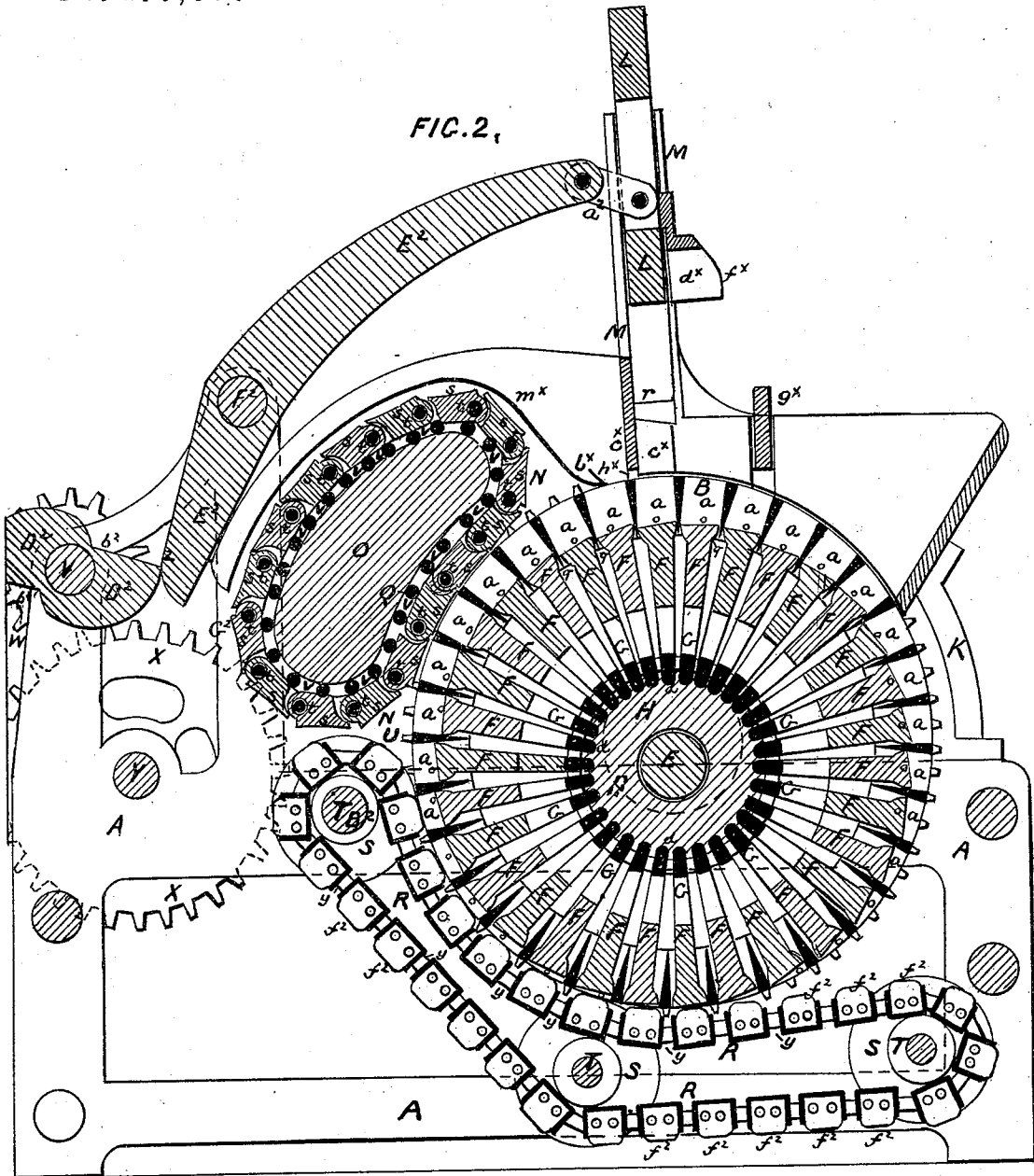
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FIG. 3.

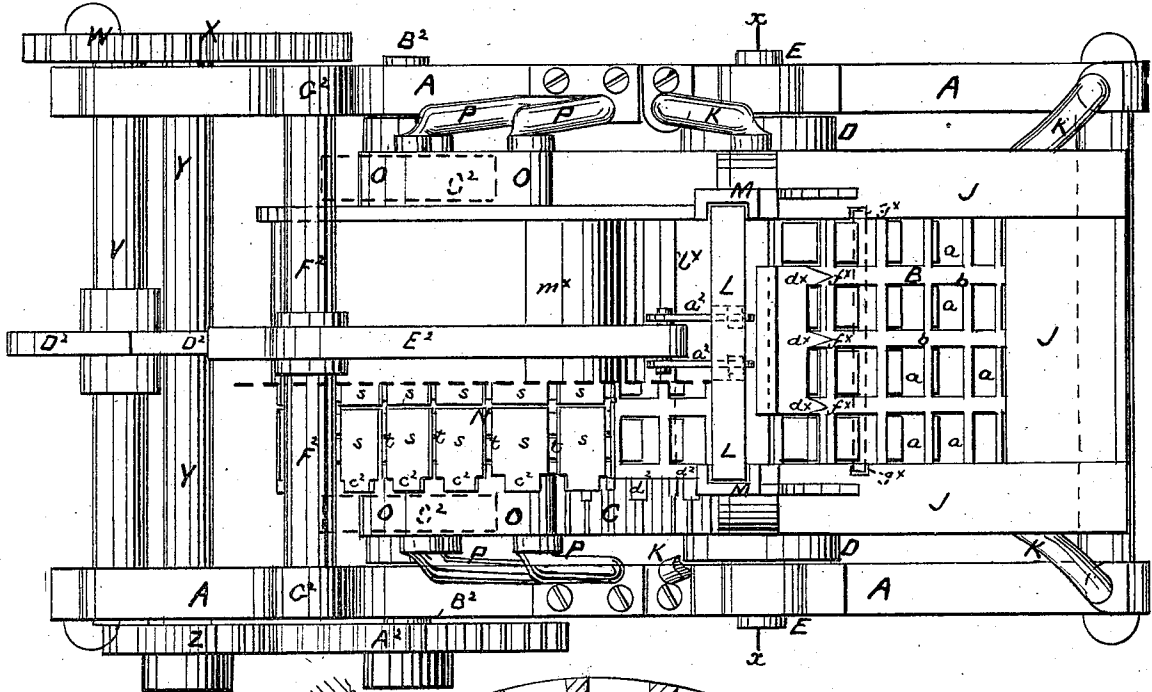
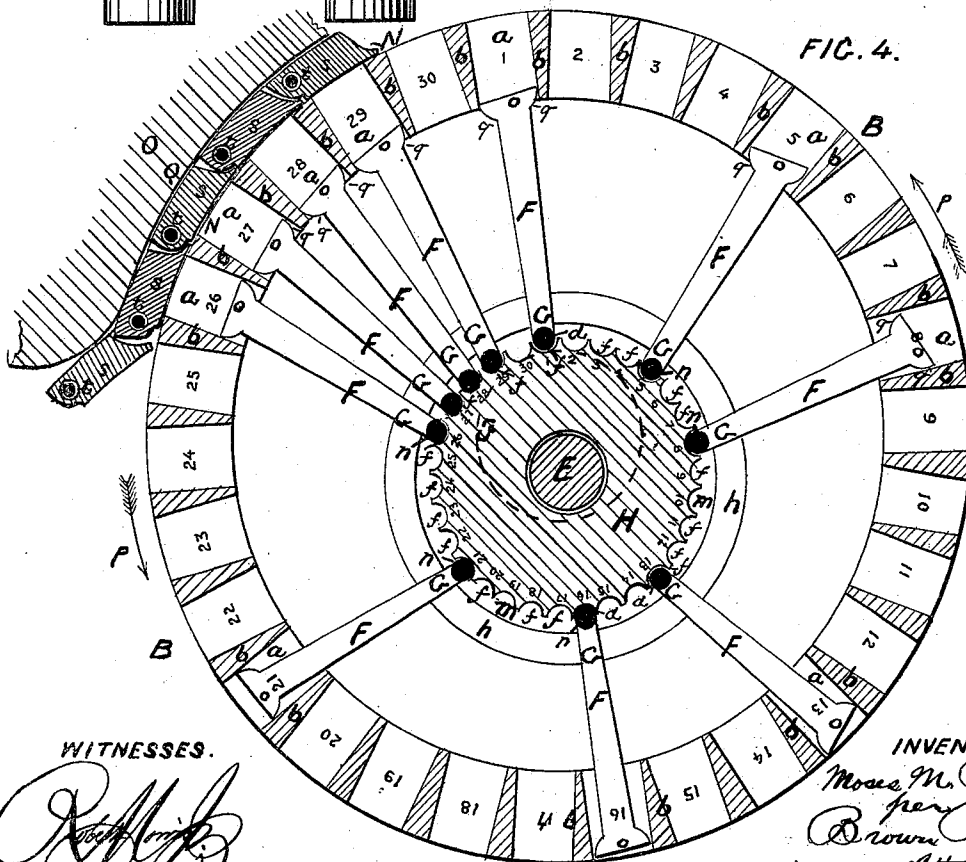


FIG. 4.



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FIG. 5.

FIG. 6.

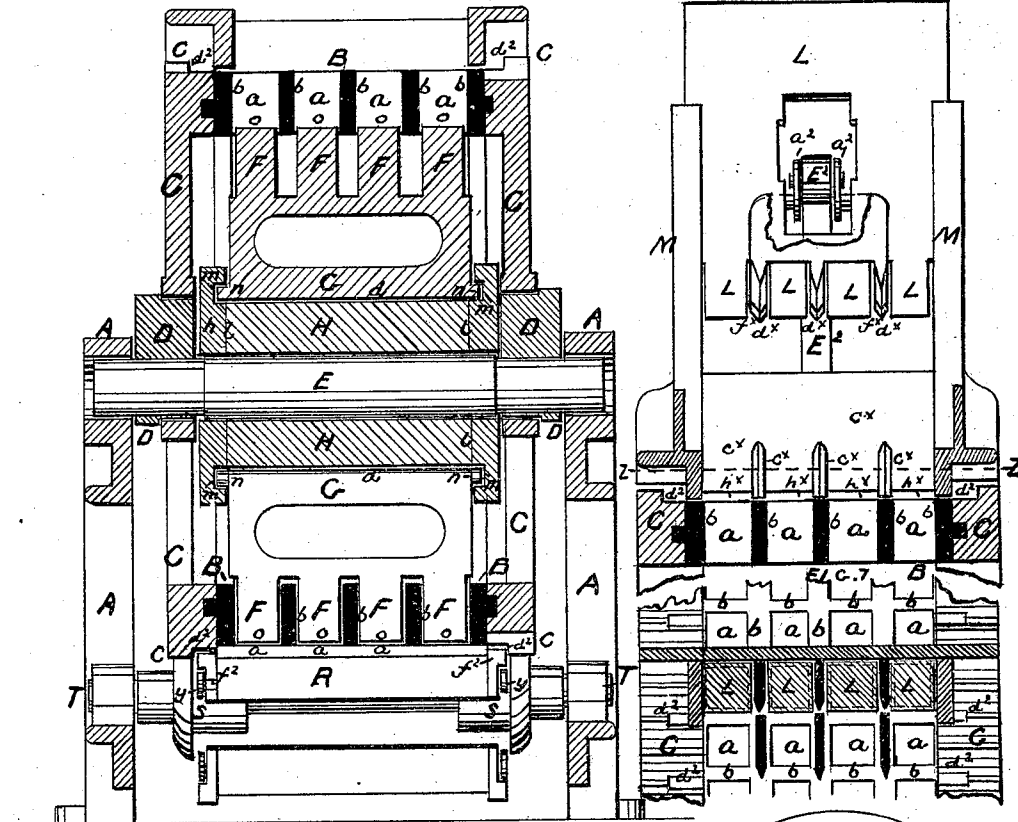


FIG. 7.

FIG. 8.

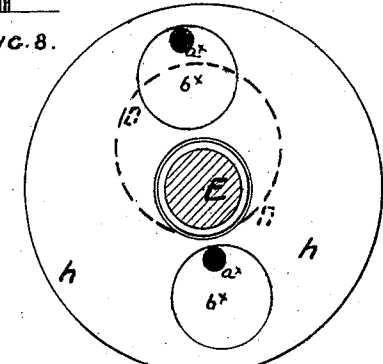
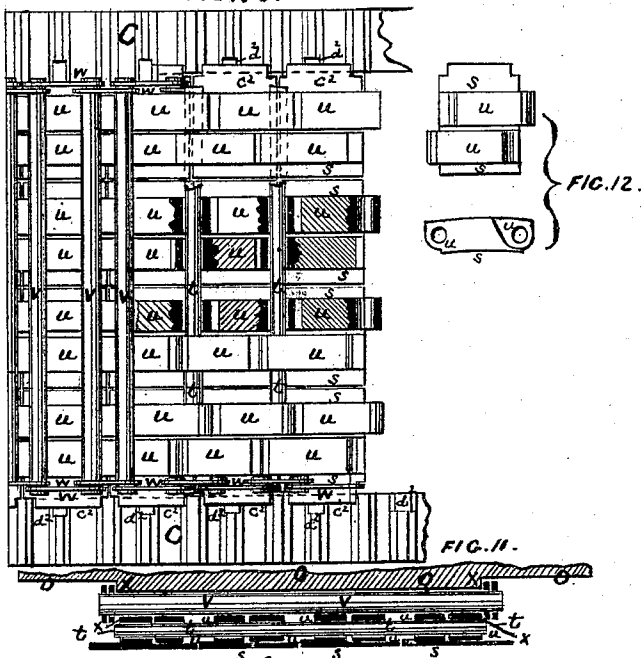
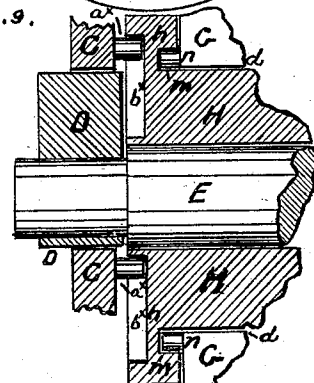


FIG. 9.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN MACHINES FOR MAKING COAL-DUST, &c., INTO BLOCKS.

Specification forming part of Letters Patent No. **170,587**, dated November 30, 1875; application filed July 15, 1875.

To all whom it may concern:

Be it known that I, MOSES M. PETTES, of Worcester, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements in Machines for Molding Coal-Dust, &c., into Blocks, of which the following is a specification:

This invention relates to a machine more particularly designed for manufacturing coal-dust into solid and compact blocks, to be used as a kindling or as a fuel; but, as will be apparent from the description hereinafter given, it is susceptible of use for manufacturing bricks, building-blocks, and other articles which are made of material such as clay, peat, &c., by molding and pressing it into shape.

This improved machine embraces in its construction a wheel which is provided with a series of peripheral pockets, having their several sides in each pocket parallel to a radial line of the wheel, which passes through the center of each pocket at the periphery of the wheel; a series of plungers, which are placed, and are free to travel, in the pockets of the wheel; a plunger to each pocket; a surface to resist the pressure of the plungers in their compression of the material in the pockets of the mold-wheel; a series of pans or troughs to receive the material discharged from the mold-wheel pockets by the action of the plunger therein; and a device to force and drive the material which is to be molded in the mold-wheel into the pockets thereof, said driver working in and through a hopper; and the invention consists, first, of a mold-wheel which is arranged for a continuous rotary movement, and of a series of plungers which are arranged, and are free to travel, within the pockets of the said wheel, one in each, and as the said wheel revolves to travel around with the same, and to be moved toward and away from the periphery of the mold-wheel through more or less of the depth of the pockets; secondly, of a device which is arranged in a line corresponding substantially with a radial line of the mold-wheel, and is adapted to be moved from time to time toward and away from the periphery of the mold-wheel, and without coming into contact therewith or

entering its pockets, for the purpose of driving or forcing the material which is to be molded into the pockets of the mold-wheel as said pockets are successively brought by the rotation of the mold-wheel into the line of movement of the said driver; thirdly, in the combination, with a continuous revolving mold-wheel, of a surface which is arranged to embrace, and be in contact with, the periphery of the mold-wheel for a greater or lesser portion of its length, and to travel in such contact with, and in the same direction as, the wheel, and which is constructed and arranged to resist the outward action of the plungers within the pockets of the mold-wheel that are opposite thereto; fourthly, in the combination, with a continuous revolving mold-wheel, of pans or troughs, which are arranged in a continuous or endless series, to be successively brought into position about the mold-wheel, and in line with its pockets, and to travel away therefrom, for the purpose of receiving the material which has been molded in the mold-wheel pockets as it is discharged by the outward movement of the plungers within the pockets, and to carry the same away from the mold-wheel; fifthly, of walls or partitions, which are arranged in the hopper to surround the peripheral boundaries of the mold-wheel pockets in the line of travel of the driver, hereinbefore referred to in the second clause of invention, except the boundary at the hindermost side thereof relative to the forward movement of the mold-wheel, in combination with a driver for forcing the material to be molded into the pockets of the mold-wheel, which is constructed to pass between and within the space embraced by the said walls; sixthly, of a device which is arranged in advance of the driver for filling the pockets of the mold-wheel, as before stated, to travel through the hopper toward and away from the periphery of the mold-wheel, and which is constructed to channel, in its movement toward the mold-wheel, the material within the hopper in line with the projection forward of the walls about the boundaries of the pockets of the mold-wheel, referred to in preceding clause of this invention, and thereby prepare the material for it

the better to enter the space between the said boundaries or walls in the hopper as the mold-wheel revolves; seventhly, in the arrangement of the traveling surface for resisting the outward action of the plungers within the mold-wheel pockets, and of the endless series of traveling troughs or pans for receiving the material discharged from the mold-wheel pockets by the operation of the plungers therein, to be both driven directly from the rotation of the mold-wheel, thus insuring uniformity and regularity in their movement relatively to each other, and to the movement of the mold-wheel; eighthly, in the arrangement, about the axis of the revolving mold-wheel, of a cylinder which has the inner ends of the several plungers hung to it, and which is arranged to turn about an axis eccentric to the axis of the mold-wheel, so that in the revolution of the mold-wheel the said drum, by turning about its own axis, will act on the plungers within the pockets of the mold-wheel to move them toward and away from the periphery of the mold-wheel; ninthly, in an interlock between the rotating mold-wheel and the rotating eccentric, for operating the plungers of the mold-wheel, as above stated, which is of such construction as to insure the movement of the wheel and eccentric together about their respective axes, and without interference with the action of the eccentric on the plungers of the mold-wheel pockets.

Besides the above, there are other improvements embraced by this invention, in the detail, construction, and arrangement of the several parts and elements which have been above referred to, as will appear from the description which follows.

In the accompanying plates of drawings my improved machine for the purposes of this invention is illustrated.

In Plate 1, Figure 1 is a side elevation. In Plate 2, Fig. 2 is a central longitudinal vertical section. In Plate 3, Fig. 3 is a plan view with some parts broken away, and Fig. 4 a sectional view of the mold-wheel on an enlarged scale from that of the previous figures. In Plate 4, Fig. 5 is a transverse vertical section on line *xx*, Fig. 3, Plate 3. Fig. 6 is a transverse section, substantially on line *yy*, Fig. 1, Plate 1. Fig. 7 is a horizontal section on line *zz*, Fig. 6, with the driver device in its lower position. Fig. 8 is a face view, and Fig. 9 a vertical section, of the interlock between mold-wheel and eccentric carrier for the plungers of the wheel. Figs. 10, 11, and 12 are views in detail of the construction of the surface for resisting the outward action of the plungers within the pockets of mold-wheel, and for driving it by the mold-wheel.

In the drawings, *A A* represent two similar supporting-frames, arranged in parallel lines, and suitably constructed and provided with appendages for the proper support and carriage of all the working and stationary parts of the present improved molding-machine, as

hereinafter referred to; *B*, the mold-wheel. In the present instance this mold-wheel is constructed of a ring shape, with four series of similar peripheral pockets or molds, *a a a a*, &c., which open both outwardly and inwardly, and are arranged in parallel and equidistant rows, and at equal distances apart in each and all the rows, about the periphery of the wheel, and are all separated from each other by walls *b b*, &c., which are parallel, in each pocket, to a radial line of the wheel that passes through the central point of each pocket on the peripheral line of the wheel. *C C*, two gear-wheels. These gear-wheels *C C* carry the mold-wheel *B*, which is rigidly fastened to and between them, with its axis coincident with their axis, and, together with the mold-wheel, they are vertically arranged in and between the parallel side frames *A*, and for the gear-wheels to turn, each, on a similar journal, *D*, both of which are rigidly fastened to the frames *A A*, with the axis of each on the same horizontal plane, and are connected together between the frames *A A* by a shaft, *E*, having its axis eccentric to, and on a horizontal plane parallel and below, the horizontal plane of the axis of the said journals *D*. *F F F F*, &c., the plungers for the pockets or molds *a a*, &c., of the mold-wheel *B*. Each mold-wheel pocket *a* is provided with a plunger, *F*, and, as shown, the four plungers for the four pockets *a*, in each and every transverse row of pockets, and inside of the inner periphery of the wheel, are severally connected to a common bar or frame, *G*, and each of these plunger-bars *G* is adapted, by its rounded edge *d*, to swing within a circular groove, *f*, which is, at the periphery, and along the length of a drum or cylinder, *H*, arranged to turn on the shaft *E*, hereinbefore referred to, and about its axis as a center.

The several cylinder-grooves *f* run in lines which are parallel, and all at equal distances apart, and there are as many cylinder-grooves *f* as there are pockets *a* in a single peripheral row of the mold-wheel; for instance, in the present case, (see Fig. 5 more particularly,) there are thirty cylinder-grooves *f* and thirty mold-wheel pockets.

In Fig. 5 the cylinder-grooves and the mold-wheel pockets are numbered consecutively from one to thirty, inclusive, and the plungers run from a groove of one number to the pocket of the corresponding number.

h, cap-plates fastened one to each end of the grooved drum *H*. The contact-face *l* of each cap-plate *h* with the ends of drum *H* is grooved in a circle concentric with the axis of the shaft *E* of drum *H*, and each circular groove *m* is suitably located to receive the trunnion-pin *n*, projecting from each end of the several plunger-bars *G*, in line with their rounded edges *d*. *o*, the working or pressing faces or ends of the several plungers *F*. These working-faces *o* of the plungers similarly fit the pockets of the wheel, and the plane of each face intersects a line drawn through the pe-

ripheral central point of its mold-wheel pocket a , and the peripheral central line of the cylinder-groove f for its plunger, at an angle which is acute on the forward side of said line in reference to the direction in which the mold-wheel is to be turned in the operation of the machine, as plainly shown in Fig. 5, the arrows $p p$ thereon indicating the direction of movement of the mold-wheel. The plungers F , &c., are beveled off, as at q , &c., Fig. 5, along the two edges of the working-faces o , which run in lines parallel to the width of the mold-wheel B . J , a hopper placed above the mold-wheel B , where it is supported by the arms $K K$ of the side frames $A A$. This hopper is open to a portion of the mold-wheel pockets a , and it is suitably located for the mold-wheel, as it revolves, to bring all its pockets into the position of the hopper. L , a device for driving or forcing the material from the hopper into the wheel-pockets a for being molded therein. This driver L is arranged between guide-posts M of the hopper J , to travel through the hopper up and down, and thus away from and toward the mold-wheel, and these guide-posts M are fixed to guide the driver L in its said movement in a vertical plane, which inclines with the direction of travel of the mold-wheel, and which, if extended, would be coincident with a plane drawn through the axis of the mold-wheel B and the axis of the cylinder-shaft E . $r r$, shoulders on guide-posts M for the driver L to abut against in its travel toward the mold-wheel, and their location is such as to hold the driver from striking the face of the mold-wheel, and to allow it to come sufficiently near to accomplish the purpose stated; N , a surface which embraces and is in contact with a portion of the mold-wheel periphery. (See more particularly Figs. 2 and 4.) This surface is for resisting the outward action of the plungers F in the mold-wheel pockets, and it is located where the mold-wheel pockets pass, in the rotation of the mold-wheel, from the hopper. The surface N is made up of a series of similar plates, s , which are hinged together, as at t , and are arranged in an endless series to pass around a fixed block, O , supported by arms P of the frames $A A$. This block O is in position, and is formed at its face Q , for the concave face of each plate s , as the plates pass in regular order and succession along the said face Q , to bear and travel against the face of the mold-wheel B . The plates s , making the surface N , as above stated, are formed as shown in Fig. 12—that is, so that when hinged together the butt u of the one plate will lap by the butt u of the other plate, which gives to the plates s a continuous surface, substantially, as they pass in contact and bear against the periphery of the mold-wheel; and, furthermore, said butts u and u of the plates are extended sufficiently over the length of the plates, as shown in Fig. 12, to secure a firm and steady bearing of the plates against the block

O as they pass around the same. Between the plates s and the faces of the block O , over which the extended butts u of the plates travel, are located rollers v , to freely roll for relieving the friction in the travel of the plates over the block O .

These friction-rollers v are severally connected to two endless chains of links, $w w$, which are arranged the one chain at one side and the other chain at the other side of the block O , and to travel around the block with the plates s . These chain-links overlap the edges x of the plates s at each side of the block O , and by such overlap hold the plates from a lateral or sidewise movement upon the block; and they also overlap the edge of the block O at each of its sides, which holds them from any sidewise or lateral movement on the block O . R , an endless or continuous series of pans or troughs, each equal in length to the width of the mold-wheel. These buckets are connected together by links y , which are pivoted to them, and they are arranged, to travel upon guide-pulleys S , which are hung by their shafts T in the side frames A , and located so as to bring the said buckets one after another into a position about and surrounding a portion of the periphery of the mold-wheel, which portion extends from about the point U , where the endless resisting-plates s leave the periphery of the mold-wheel, to and a little beyond the extreme and lowest point of the mold-wheel, all as plainly shown more particularly in Fig. 2 of the drawings. V , the driving-shaft of the machine, arranged horizontally to turn in bearings of the side frames A . This driving-shaft V , by its gear-wheel W , gears into a gear-wheel, X , of another horizontal shaft, Y , turning in bearings of the side frames A ; and this shaft Y , in turn, by a gear-wheel, Z , gears into a gear-wheel, A^2 , of a horizontal shaft, B^2 , turning in bearings of the side frames A , and carrying two similar gear-wheels, C^2 , which gear into the teeth of the mold-wheel gear-wheels $C C$ at the outside thereof. Through this system of gearing the mold-wheel B is made to revolve with a continuous rotary movement by applying power to the driving-shaft V . $D^2 D^2$, two cams on driving-shaft. These cams D^2 , as the driving-shaft revolves, in turn, act against the edge z at one end of a lever-arm, E^2 , which is suspended, by a fulcrum-shaft, F^2 , in and between the two posts G^2 of the side frames $A A$, and from such shaft is extended and connected to the driver L through links $a^2 a^2$. The cams D^2 are for lifting the driver away from the mold-wheel, and they are formed, as at $b^2 b^2$, to escape from the end of the lever which carries the driver L , so that the driver may drop freely toward the periphery of the mold-wheel. As there are two cams, obviously the driver lifts and falls twice for each revolution of the driving-shaft. The plates s , for resisting the outward action of the plungers F within the mold-wheel pockets, are made with a projection, c^2 , at each side

of the block O, about which they travel, and these projections, in turn, interlock with the teeth of the gear-wheels carrying mold-wheel, and thus insure the travel of the endless series of resisting-plates with the rotation of the mold-wheel. It is best in this interlock of the plates *s* with the gear-wheels C to make their projections of sufficient length to lie over and across a tooth of said gear-wheels in each interlock of them therewith, and to so accommodate the plate projections *c*² every other tooth of the gear-wheels is cut away, as at *d*². (See Figs. 3, 5, 6, 7, and 10.) *f*², lugs, one at each end of each of the endless series of buckets R. These lugs project beyond the open side of the buckets, and they are shaped in length and width to interlock with the teeth of the gear-wheels C, carrying the mold-wheel B in the same way as the projections *c*² of the pressure-resisting plates *s*, and through them, in the rotation of the mold-wheel, the endless series of buckets is made to travel directly with the mold-wheel.

The operation of the machine, constructed and arranged in its several parts as above described, is as follows: The revolving of the drive-shaft, through the intermediate gearing described, continuously rotates the mold-wheel, and also lifts and lets fall the driver from time to time. By the rotation of the mold-wheel the endless series of pressure-resisting plates, and also the endless series of buckets R, are made to travel continuously, which brings the pressure-plates *s* successively against one portion of the mold-wheel periphery, and the buckets opposite another portion of the mold-wheel periphery, as the mold-wheel revolves, and this travel of the said plates and the said buckets is in the same direction as that of the mold-wheel. The said movement of the driver is such, relatively to the rotation of the mold-wheel, as to secure the drop of the driver once for each and every time a transverse row of pockets of the mold-wheel comes into a line coincident with its line of travel and a line drawn through the two centers, one of the mold-wheel and the other of the plunger-cylinder; and, furthermore, the movement of the pressure-plates, and also of the buckets R, relatively to the rotation of the mold-wheel, is such that the pressure-plates will closely cover the pockets of the mold-wheel when in contact therewith, and the open sides of the buckets will be opposite the pockets of the wheel.

The rotation of the mold-wheel, as above stated, carries the plungers with the wheel, and thus turns the drum H, to which the plungers are hung, around on its shaft E, and as said shaft is eccentric to the axis of rotation of the mold-wheel, the plungers are thereby made to travel in and out through the pockets of the mold-wheel. This in-and-out movement of the plungers through the mold-wheel pockets is such, relatively to the planes of operation of the driver L, and of the press-

ure-plates *s*, and of the buckets about the mold-wheel, that the plungers shall be at their innermost position in the pockets of the mold-wheel, which are in line to be filled by the driver, and, as they pass from the driver to the pressure-plates *s* and buckets R, shall be continuously moved outwardly for compressing the material in the molds against the pressure-plates, and for discharging it after being molded into the buckets, and then, as they leave, the said buckets shall be moved inwardly to their innermost position for being again filled by the driver, and so on, as before. As the plungers travel, as above described, they necessarily must swing more or less in their bearings on the drum H, and this swing to the plungers is accommodated within the molds by the bevel therein described of the plungers, and without any "bind" between the plungers and the sides of the pockets or molds of the mold-wheel. The angular direction to the working-faces of the plungers secures, substantially, a parallel compression of the material in the pockets, between said working-faces of the plungers F and the resisting-surface of the pressure-plates *s*, before leaving the pressure-plates. Were the working-faces right-angular instead of angular, as described, under the eccentric movement of the plunger-cylinder H, relatively to the mold-wheel, the plungers would not squarely compress the material in the molds between the working-faces of the plungers and the resisting-surface of the pressure-plates.

Figs. 8 and 9, as before stated, illustrate an interlock between the mold-wheel gear C and the plunger-drum H, and this is shown separate, more particularly to avoid confusion in the other views. This interlock consists of studs *a*^x, either on one or both of the gear-wheels C, at equal distances from the common axis of the wheels, and in positions opposite to each other, and of round-shaped slots *b*^x in either one or both ends of the plunger-drum, in position for the said pins to play therein, and having sides of sufficient length to allow the plunger-drum to have its full eccentric movement as the drum is rotated by the mold-wheel, as described. This interlock of the studs secures the movement together of the mold-wheel and plunger-drum, and obviates all possibility of any drag of the plunger-drum as the mold-wheel revolves. The driver L does not enter the pockets of the mold-wheel as it falls, but simply drives the material from the hopper into the pockets of the mold-wheel in line thereunto.

To increase the efficiency of this mode of filling the pockets of the mold-wheel, the hopper is provided with stationary partitions or wall *c*^x *c*^x, in position to surround three sides of the mold-wheel pockets as they successively come into line with the driver, and to leave the hindermost side of the pockets, relatively to the rotation of the wheel, clear for the material in the hopper to be carried in-

to the space between the three walls. The driver is slit at its striking-face sufficiently for it to pass down over and in and between the said walls $c^x c^x$, to act in the material in the space between them. $d^x d^x$, blades which are fixed to front face of driver. These blades are comparatively sharp at their edges $f^x f^x$, and they are located on the driver, so that when it drops they will cut or channel the material in the hopper just in advance of the hopper-walls $c^x c^x$, and thus the better prepare the material to enter the spaces between the hopper-walls. g^x , a slide arranged in hopper transversely to the width of the mold-wheel. This slide is to be set farther from or nearer to the periphery of the mold-wheel, and it is a gate by which to regulate the amount of material passing under it to the plane of operation of the driver. Openings $h^x h^x$ are made in one of the hoppers for the surplus at the mold-wheel pocket, as filled by the driver L, to pass away with mold-wheel. l^x , a knife-edge fixed in position to cut off the surplus at the pockets of the mold-wheel as they pass from the hopper, and m^x an upward curved extension or continuation of the knife-edge l^x , for conducting off the surplus cut by the knife-edge, as aforesaid. This curved continuation also shields and covers pressure-plates $s s$, and prevents the surplus material from interfering with and clogging them.

It is preferable to weight the driver sufficiently to increase its power to force the material into the pockets of the mold-wheel; but, instead of weighting it, springs may be used for the same purpose.

The walls of the mold-wheel pockets, which run in parallel lines with the direction of rotation of the mold-wheel, may be made of steel plates, with sharp edges, so as to act as cutters to cut the material in the hopper under the blow of the driver.

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

1. The combination, with a continuous rotating mold-wheel, of a driver for filling its molds, which is arranged for a reciprocating movement toward and away from the mold-wheel, and without contact with and entrance into the molds of the mold-wheel, all substantially as described.

2. The combination, with a continuous rotating mold-wheel, in the molds of which plungers are arranged to act, substantially as herein described, of an endless series of pans

or troughs R, for receiving the molded blocks as discharged from the mold-wheel by the plungers, which series of pans is arranged to lie about the wheel, and to move continuously along and in the same direction therewith, substantially as herein described.

3. Blades d^x , arranged to channel the material in the hopper in advance of walls or partitions c^x therein, substantially as and for the purpose described.

4. A continuous rotating mold-wheel, in combination with plungers adapted to move through its molds, and to be operated by the eccentric rotation of their carrier relatively to the axis of rotation of the mold-wheel, substantially as and for the purpose specified.

5. The combination, with a continuous rotating mold-wheel, of a continuous rotating carrier for the plungers of the mold-wheel, which rotates about an axis eccentric to that of the mold-wheel, and is connected with its mold-wheel by an interlock, constructed and arranged substantially as herein described, and for the operation of the plunger-carrier relatively to the mold-wheel herein described, for the purpose specified.

6. The combination, in one machine, of a continuous rotating mold-wheel, B, which has plungers F arranged to travel in its molds, a driver, L, an endless series of pressure-plates, s , and an endless series of pans or troughs, R, each and all arranged together for a co-operative action, substantially as described, for the purpose specified.

7. The rolls v , extending across the width of the pressure-plates s , and interposed between such plates and blocks o , around which the plates travel, substantially as described, and for the purpose specified.

8. The pressure-plates s , having the extensions or lugs for an interlock, by which to drive them about the block or form, substantially as described.

9. The angular working-faces o of the plunger, substantially as and for the purpose specified.

10. The beveled edges g of the plungers, substantially as described, for the purpose set forth.

11. The cam D^2 and lever E^2 , in combination with a driver, L, substantially as described.

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Witnesses:

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