(No Model.) 3 Sheets—Sheet 1.

W. JOHNSON.

BRICK MACHINE.

No. 415,343. Patented Nov. 19, 1889.

Fig. 1.

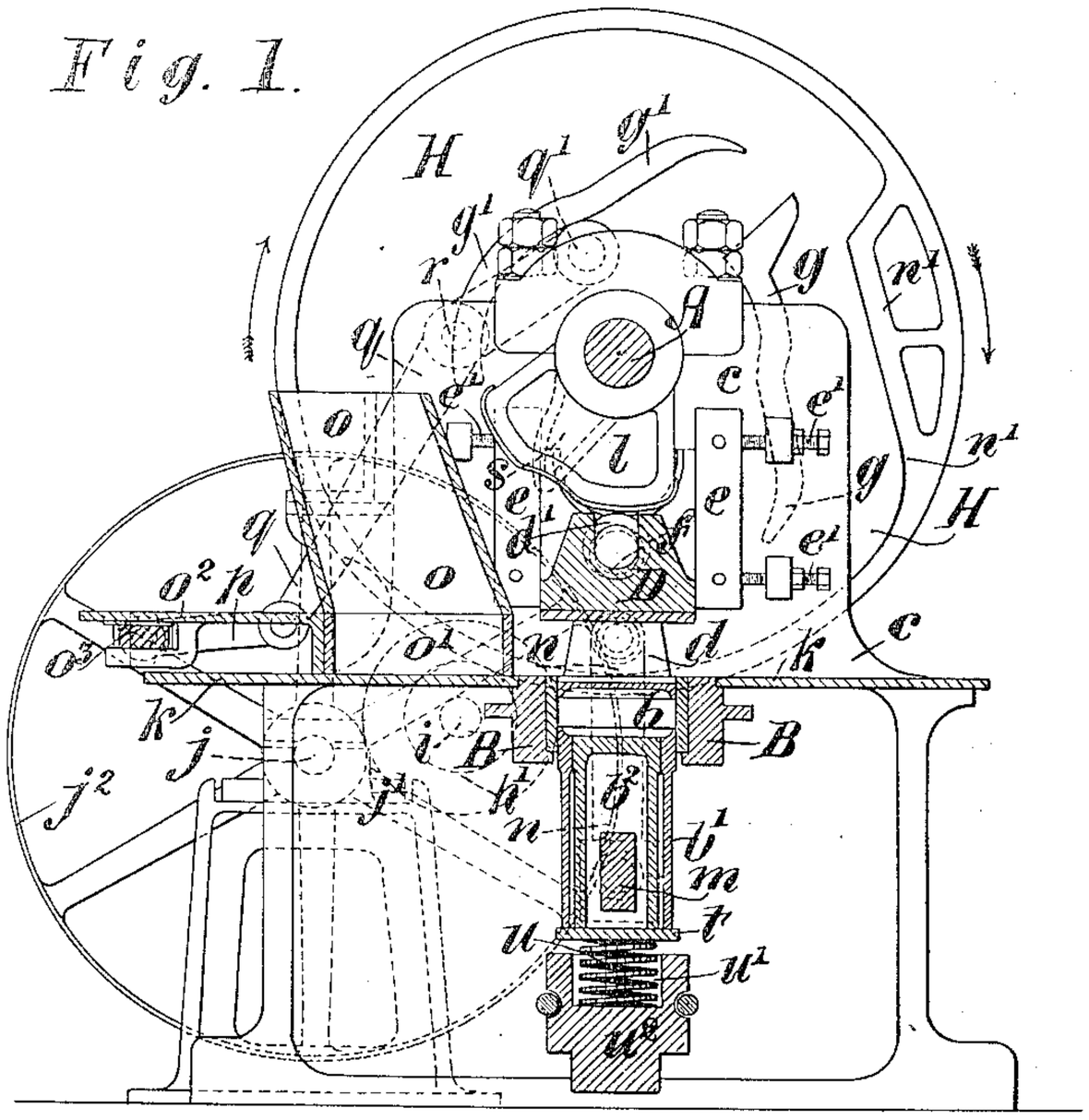
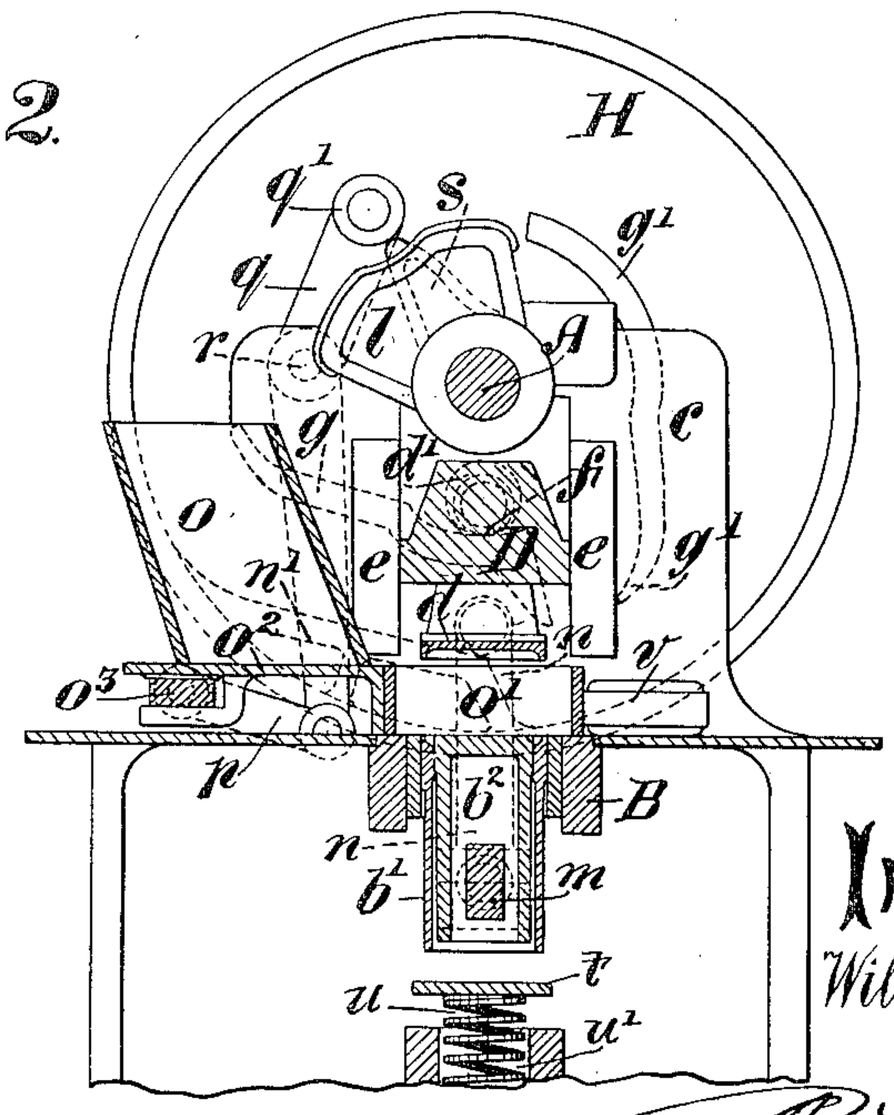


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

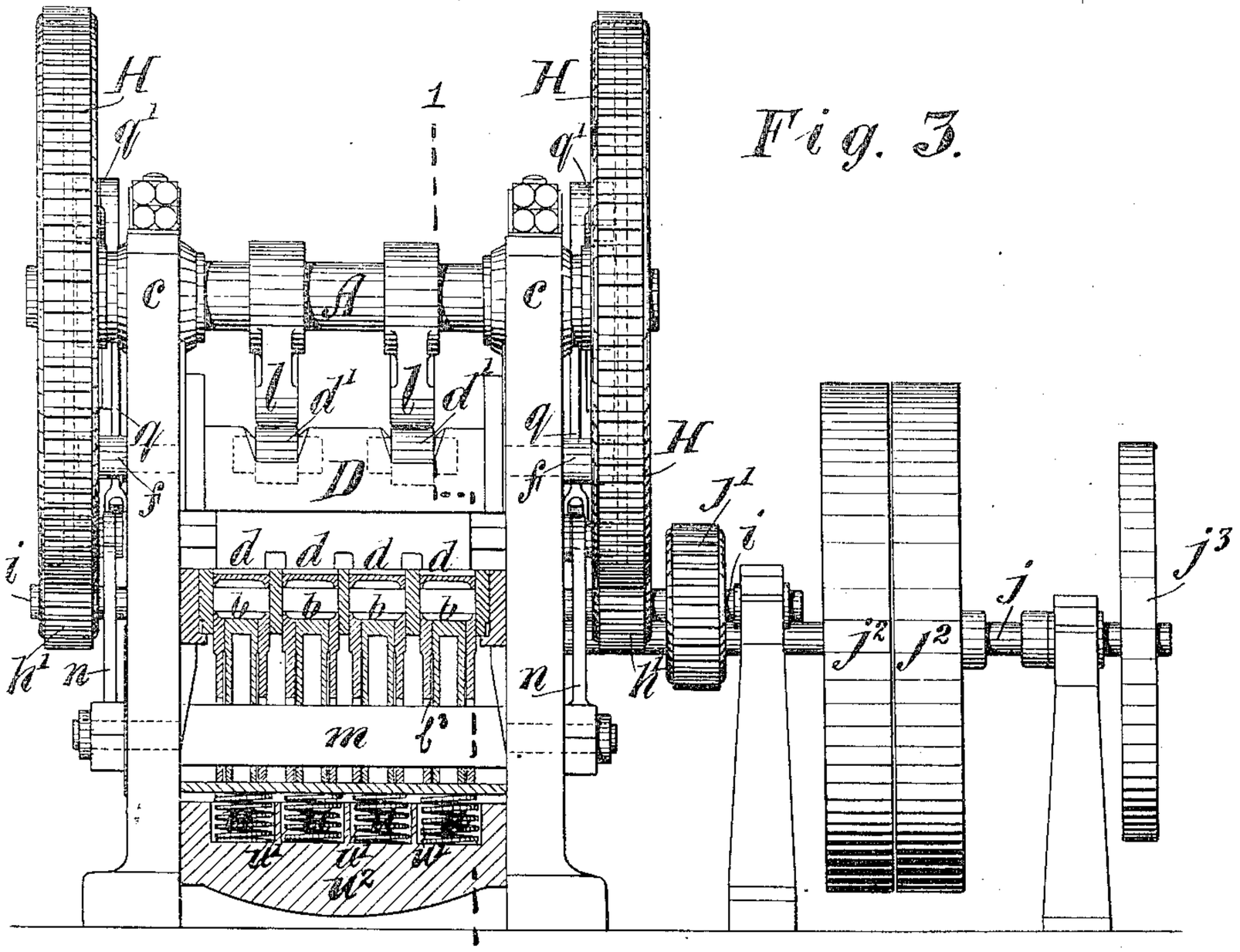
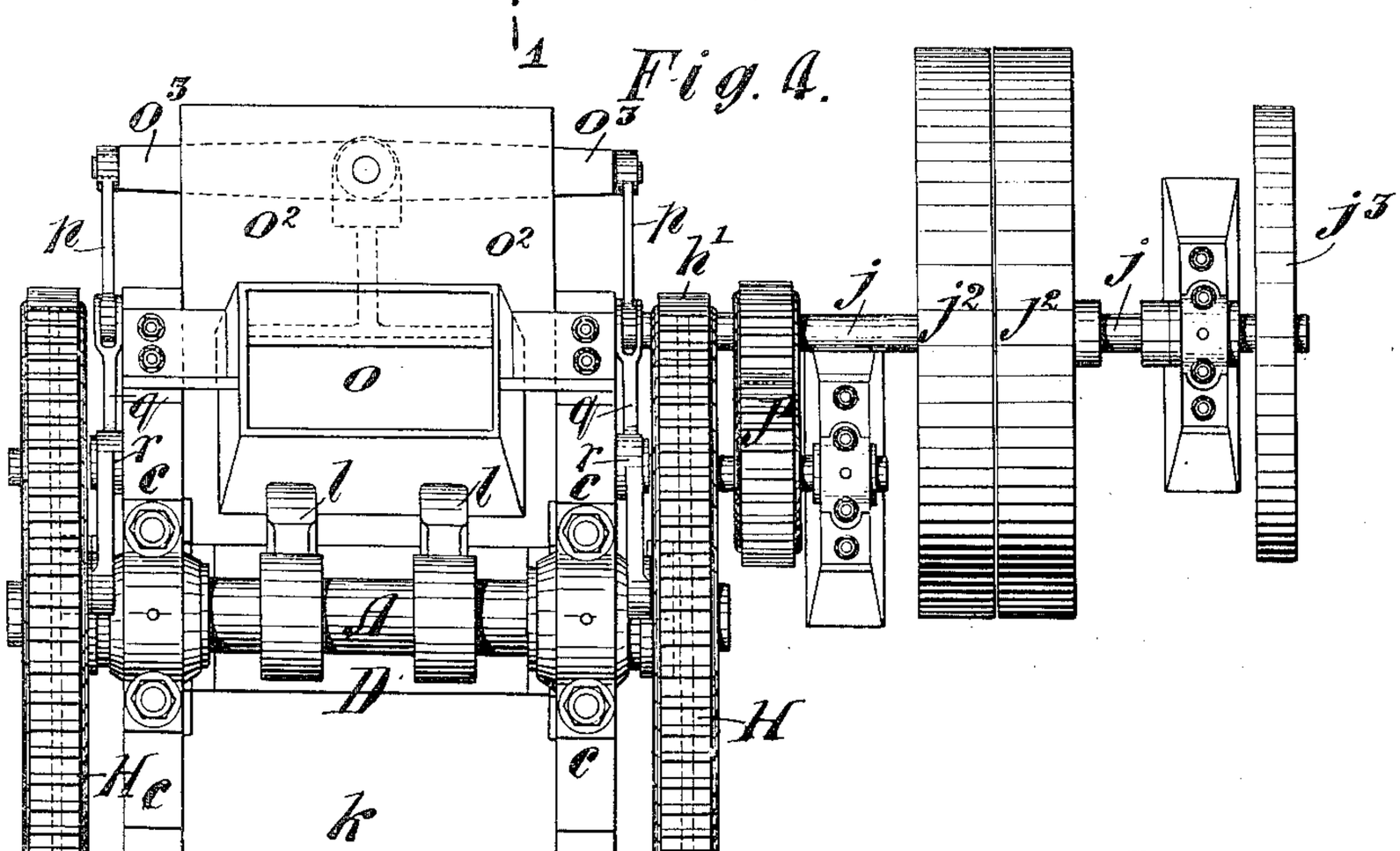


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

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BRICK MACHINE.

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Fig 5.

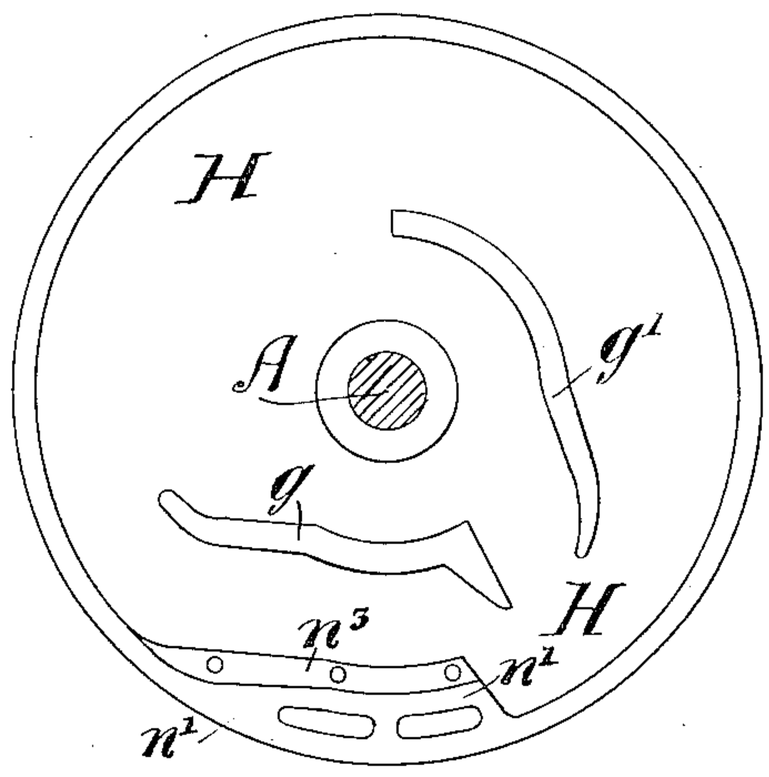


Fig 6.

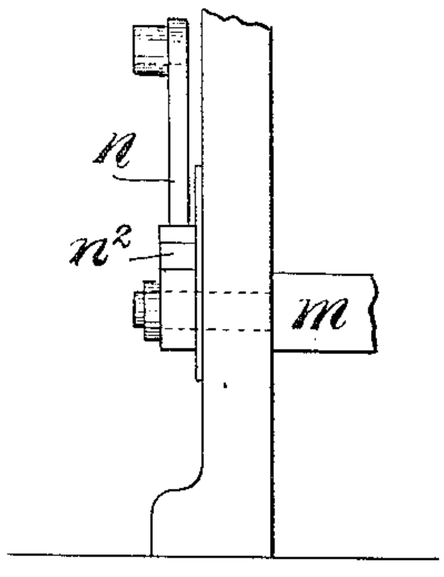
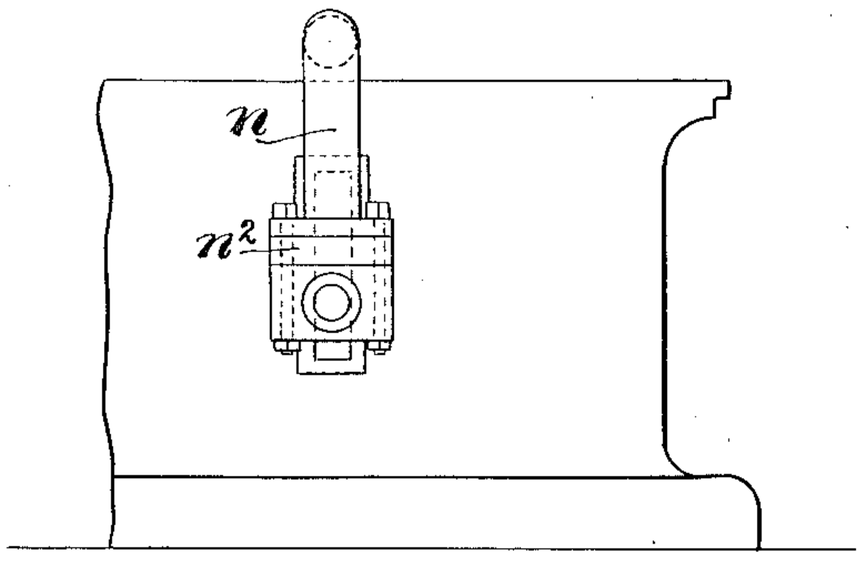


Fig 7.



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UNITED STATES PATENT OFFICE.

WILLIAM JOHNSON, OF LEEDS, COUNTY OF YORK, ENGLAND.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 415,343, dated November 19, 1889.

Application filed August 14, 1889. Serial No. 320,676. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JOHNSON, engineer, a subject of the Queen of Great Britain and Ireland, of the Castleton Foundry, Armley Road, Leeds, in the county of York, England, have invented certain Improvements in Machinery for Molding and Pressing Clay, Coal-Dust, and other Substances, of which the following is a specification.

My invention relates to machinery for molding and pressing substances so as to produce bricks, tiles, briquettes, blocks, balls, or cohering masses.

My improved machine is adapted for use in the manufacture of building and fire bricks, tiles, artificial fuel, and, generally, for use in cases wherein substances or mixtures in a powdered or subdivided or semi-cohering condition have to be formed into cohering masses.

In my machine the substance to be treated is fed from a hopper into molds by means of a reciprocating charger. The pressing-plungers descend before the withdrawal of such charger. The plungers are raised to permit the charger to withdraw and then descend a second time and are forcibly pressed into the molds. The plungers are again withdrawn and pistons, which are sustained by springs against the pressure of the plungers, are pushed upward to discharge the molded and pressed bricks or briquettes from the molds.

In the accompanying drawings, Figure 1 represents a vertical cross-section on the line 1 1 in Fig. 3. Fig. 2 is a corresponding view showing the acting parts in different positions. Fig. 3 is a front elevation, partly in section, of the machine. Fig. 4 is a plan of the machine. Fig. 5 is a separate view of one of the cam-wheels H. Fig. 6 is a view of one of the links *n*. Fig. 7 is a front view of the same link.

The machine, as represented, is designed to form four bricks or briquettes during each revolution of the main shaft A. The four molds *b* are fitted in seatings in a strong cross-beam B, which helps to connect together two standards *c c*, which carry the shaft A. The four plungers *d d* are attached to a heavy pressing-head D, which is adapted at each end to slide between planed cheeks *e e*, which are secured to and are adjustable upon the insides of the standards, so that the said pressing-head is guided to move up and down in a straight vertical line—that is, in a direct line toward and from the molds. The cheeks *e e* can be adjusted by means of screws *e'*, so that the vertical line of motion of the pressing-head can be adjusted to suit the molds in order that when the pressing-head descends the ends of the plungers shall enter the mouths of the molds. The said screws also furnish means for adjustment of the cheeks, so that the slides shall have only a sufficient amount of working freedom, as will be understood. The ends of the pressing-head or projections therefrom pass through slots in the two standards *c*, and these projecting ends carry anti-friction bowls *f*, which are mounted to revolve upon studs. These bowls are acted upon by curved cam-rails *g g'*, (seen, also, in Fig. 5,) which are attached to or formed upon the sides of the two cam-wheels H H, which are provided with teeth, so as to constitute spur-wheels. Two pinions *h'*, fixed upon a cross-shaft *i*, mesh with the teeth of the two wheels H, and the shaft *i* receives motion from the first driving-shaft *j* through the spur-wheels *j'*.

The shaft *j* is provided with fast and loose pulleys j^2 and with a fly-wheel j^3. When the fast pulley is revolved by means of a driving-belt, a slow powerful motion is imparted to the two wheels H and thereby to the main shaft A, upon which the two wheels are fixed. As the cam-wheels H revolve in the indicated direction, the leading end of the cam-rail *g* passes below the bowl *f* on the pressing-head and lifts the said bowl. As both of the wheels H are of the same formation and are both provided with corresponding sets of cam-rails, it will be seen that the pressing-head is lifted by both ends, and continues to be parallel with the table *k* of the machine as the pressing-head rises and falls. The two cam-rails *g*, after lifting the pressing-head, keep it up for a time and then drops it; but it is immediately raised again by the other set of cam-rails *g'*. Upon the shaft A are fixed two cams *l l*, which act upon bowls *d'*, which are mounted to revolve upon the pressing-head.

The said cams come into action after the cam-rails g' have dropped the pressing-head. Each cam l is formed with two cam-curves, with a recess between them. These cam-curves are slightly spiral with relation to the axis of motion, so that the cams have two powerful pressing-down actions upon the pressing-head, with a dwell between the two actions. The material to be charged into the molds is supplied to a hopper o. A charger o', in the form of a box without a bottom, is arranged to slide to and fro on the face of the table k. When in one position, it forms a downward continuation of the hopper, as seen in Fig. 1, and when moved into its other position (seen in Fig. 2) it incloses the mouths of the molds. The said feeder is provided with a rearward extension-plate o^2, which slides below the bottom of the hopper when the feeder is moved toward the molds, so that the contents of the hopper are retained by such plate. A cross-bar o^3, attached to the plate o^2, is connected by means of a link p with the lower end of a lever q, which is mounted upon a fulcrum-stud r, which is fixed to the standard, there being a corresponding arrangement at each side of the machine. The upper end of each lever is provided with an anti-friction bowl q'. At each revolution of the shaft A two tappets upon the two wheels H strike the bowls q', and by moving outward the upper ends of the two levers cause the lower ends thereof to move inward—that is, in the direction indicated in Fig. 1—the result being that the charger is moved from its position in Fig. 1 to the position in Fig. 2. The tappet on one side of the machine is indicated by the dotted lines in Figs. 1 and 2. The return movements of the said lever and charger are effected by the cam-rails g. After the presser-head has been lifted out of the way by the rails g' the leading ends of the rails g come above or behind the bowls upon the levers q and force the upper ends of such levers inward, thereby withdrawing the charger below the hopper.

The parts of the machine as so far described are substantially the same as parts which have been used in machines for the manufacture of bricks previously to my invention. Within each mold a piston b is fitted to slide up and down. These pistons are of a compound formation—that is to say, each piston consists of one piston b^2, sliding within the other b', as clearly seen in Figs. 1, 2, and 3. The reason for this construction is that the machine as drawn is adapted for use in the formation of briquettes having rounded edges, so that the upper face of the piston, being concave or dished, the briquettes could not be pushed sidewise off the tops of the pistons when the latter have lifted the briquettes up to the mouths of the molds. For many purposes, however, this compound construction would not be required. The outer piston b' is shaped to form the rounded edges on the lower face of the briquette, the inner piston having a flat face. The faces of the plungers d are dished to impart the required form to the other face of the briquette. A strong bar m passes through slots in all the pistons, and the two ends of this bar pass through slots in the standards and engage with the lower ends of two links n n. The upper ends of these links are provided with anti-friction bowls, which are acted upon once in each revolution of the shaft A by means of inclines n' upon the two cam-wheels H. As the said wheels revolve these inclines pass below the two bowls and raise the same, whereby the bar m is lifted and raises all the pistons. It will be seen that the slots b^3 in the outer piston b' are longer than the depth of the lifting-bar, so that the latter has a little play in the said slots. The effect of this is that the inner pistons rise a little in advance of the outer pistons.

I construct the parts so that bricks or briquettes of different thicknesses can be made. This I effect by lengthening or shortening the links n, as may be required, and by adding to or taking from the incline n'. Figs. 6 and 7 show how I vary the length of each link n. A packing-piece n^2 is interposed between the head n of the link and the body of the same. This packing can be entirely removed or be changed for a thinner packing, thus shortening the link, the effect being that the bar m does not descend so low, and a thinner briquette is produced. It is necessary at the same time to alter the inclines n', or the pistons would be lifted too high. Fig. 5 shows how I effect this alteration. I apply a facing n^3 upon the incline, such facing corresponding in thickness to the packing n^2. When such packing is removed, the facing n^3 is also removed.

Referring to Fig. 1 it will be seen that the pistons b' b^2 are resting upon a plate t, which is sustained by springs u. These springs are of great power, so as to resist the pressure of the material in the molds during the pressing operation, at the same time that the said springs will yield to an excessive pressure—such, for example, as would arrest the motion of the cams l l. The said springs are seated in recesses u' in a cross-beam u^2, which also serves to connect together the lower parts of the two standards c. The form and material of these springs may be varied, so long as yielding supports capable of sustaining the required pressure are employed.

The operation of the machine may be described as follows: In Fig. 1 the parts are represented as when the contents of the molds are receiving the final pressure. As the cam-wheels revolve, the cams l pass away from the bowls d', and the cam-rails g, coming round, lift the pressing-head. When it is raised high enough for the charger to pass below, the presser-head is sustained by the concentric portions of the cam-rails. In the meantime the tappets s have commenced to act upon the levers q and the charger, full of the mate-

rial to be molded, has commenced to move inward, and when the presser-head is out of the way the said charger moves below it into the position seen in Fig. 2. Material will now fall from the charger into the molds and fill the same. The charger is of such proportions as that when the molds are full there will still be some material left above the mouths of the molds. The rails *g* now release the presser-head, which falls by its own weight. As the weight of this part and of the attached plungers are considerable, the excess of material is forced into the molds and their contents receive a first compression. The presser-head is immediately lifted by the cam-rails *g'*, and the rails *g*, acting on the bowls *q'*, effect the withdrawal of the charger into position below the hopper to receive a fresh charge. During such withdrawal of the charger the molds are again filled up level from the material remaining in the charger. The cam-rails *g'* now release the presser-head and the plungers fall a second time into the molds, giving a second compression to the charges. The cams *l* have now come around to act upon the bowls *d'*. These cams, forcing down the presser-head, give two powerful squeezes to the charges in the molds, with a dwell between. It will thus be seen that the charges in the molds receive four compressions. The yielding pressure of the springs assists in promoting the discharge of the contained air. When the cams *l* have ceased to act, the cam-rails *g* again lift the presser-head, and at the same time the inclines act upon the bowls upon the links *n* to raise the bar *m*, and thereby the pistons, until the latter are in the positions indicated in Fig. 2, the inner pistons b^2 having risen to the same height as the outer edges *b'*, or a little over, so as to be level with the top of the table. The charger now advances and pushes off the briquettes, as seen in Fig. 2, wherein *r* indicates a briquette. The bar *m* is now permitted to drop quickly by the bowls running down the sharp inclines at *n'*, and the pistons go down, the material from the charger at the same time following the pistons and passing into the molds. When desirable, I make the plungers hollow, so that steam can be admitted to heat the surfaces which come in contact with the charge to prevent the sticking of the material being pressed to the plungers. For the same reason steam may be admitted into the pistons.

The number of molds may be less or greater than four, and their proportions and forms may be varied to suit circumstances.

Having now fully described my invention, I state that I claim—

1. The pistons $b' b^2$, the slots b^3, the links *n*, bar *m*, and the inclines $n' n^3$, in combination with the main shaft A, the pressing-cams *l l*, and the two cam-wheels H, with the parts *g g'* and the presser-head D, provided with plungers *d*, substantially as and for the purpose set forth.

2. The pistons $b' b^2$, the slots b^3, the links *n*, bar *m*, the inclines $n' n^3$, and the springs *u*, in combination with the presser-head D, the plungers *d*, the cam-wheels H, the parts *g g'*, the tappets *s*, the lever *q*, the charger *o'*, and the hopper *o*, substantially as and for the purpose set forth.

3. The links *n*, the packings n^2, the facings n^3, and the bar *m*, in combination with the molds *b*, the pistons $b' b^2$, or with solid pistons, the plungers *d*, and the cam-wheels H, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM JOHNSON.

Witnesses:
EDWARD K. DUTTON,
FREDK. DILLON.