J. J. SHEDLOCK.

BRIQUET PRESS.

APPLICATION FILED JULY 10, 1908.

1,000,204.

Patented Aug. 8, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

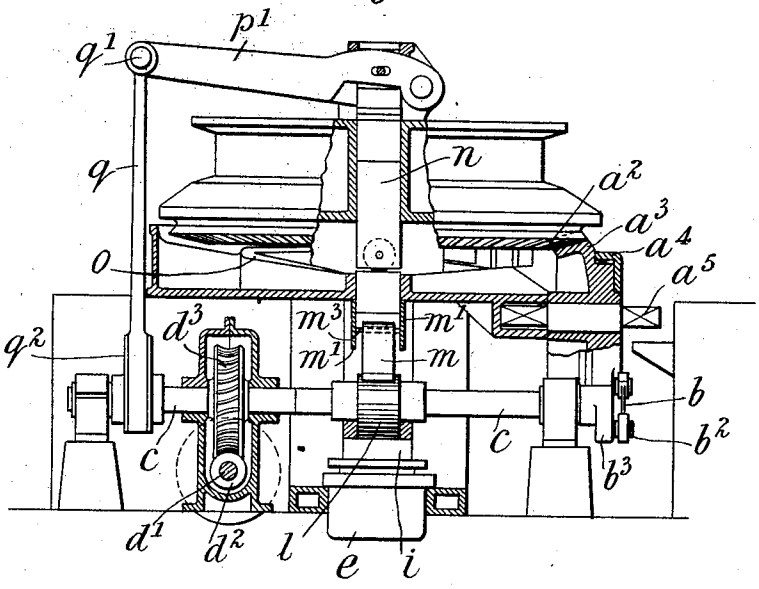
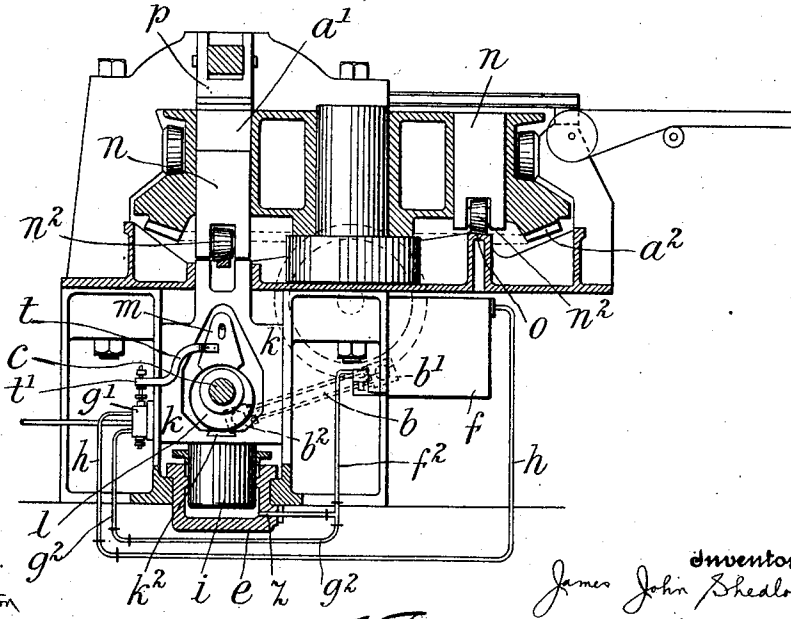


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

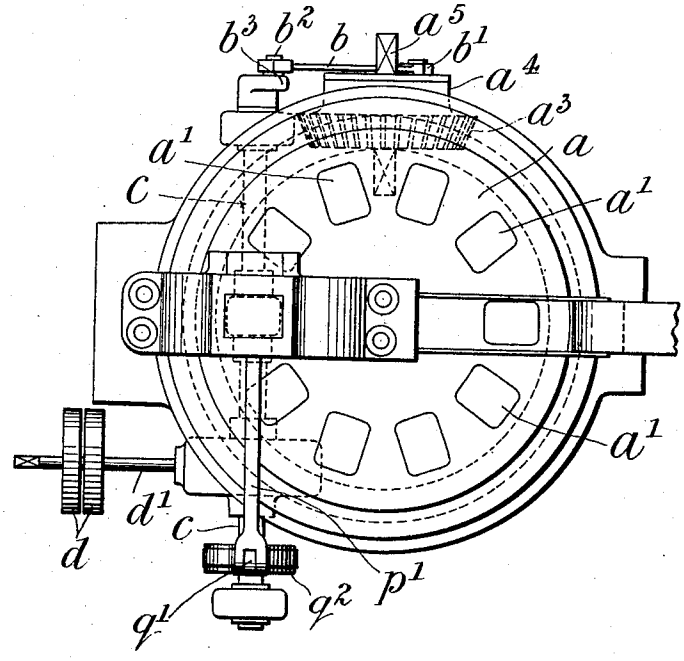
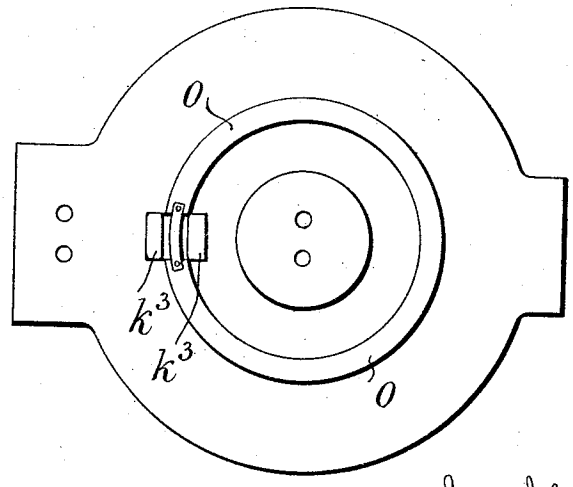


Fig. 4.



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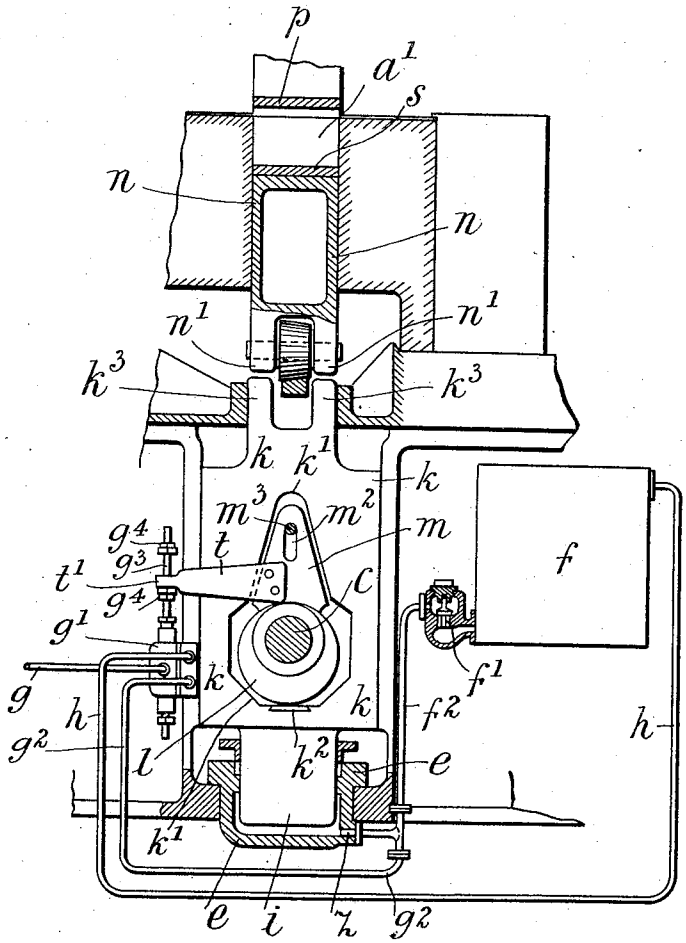
3 SHEETS—SHEET 3.

Fig. 5.



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1,000,204. BRIQUET-PRESS. James John Shedlock, Little Bentley, England. Filed July 10, 1908. Serial No. 442,947.

To all whom it may concern:

Be it known that I, James John Shedlock, engineer, a subject of the King of Great Britain, residing at Little Bentley, in the county of Essex, England, have invented certain new and useful Improvements in Briquet-Presses, of which the following is a specification.

This invention has for its object improvements in or relating to apparatus for molding and compressing purposes such as the manufacture of briquets or the like; and although more particularly designed for molding and pressing artificial fuel material into blocks or briquets nevertheless my said invention may be employed for any other purposes to which it may be applicable, as for example, for molding and pressing ore briquets, or for molding and pressing earthenware articles, such as tiles.

The present invention comprises the hereinafter described method of operating apparatus for molding and compressing purposes for use in the manufacture of briquets or the like wherein the first and greater part of the compression stroke of the compression mechanism is produced by mechanical action and the final part of the compression stroke is produced by hydraulic action such method consisting in mechanically imparting motion to the hydraulic ram head and ram for the first and greater part of the pressure stroke thereof by mechanical means and while thus mechanically imparting said motion to the ram head and ram causing or permitting water at little or no pressure (*e. g.* water at atmospheric pressure) to enter the hydraulic cylinder and keep same full as the ram is mechanically moved outward as aforesaid and then admit high pressure water to said cylinder for the final part of the compression stroke; this method producing not only considerable economy of high pressure water but also enabling the hydraulic pressure at the end of the stroke to be maintained (*i. e.* dwell and follow) upon the material to be compressed for the desired period.

Apparatus for molding and compressing purposes according to the present invention comprises a molding chamber or chambers (which may be provided with dies of any desired form or size) a plunger adapted to be reciprocated in each said chamber and means for operating said plunger said means comprising a frame mounted on a hydraulic ram, mechanical means for operating said frame and ram through the greater part of the pressure stroke, means for simultaneously filling the hydraulic cylinder with water at little or no pressure, and means to then admit water at high pressures for the remainder of the pressure stroke.

In conjunction with the foregoing the present invention also comprises other details and improvements all as hereinafter described and claimed. And in order that my present invention may be the more easily understood and readily carried into practice I will now proceed to describe same with reference to the accompanying drawings which illustrate my invention as designed for a fuel press or fuel briqueting press.

Referring to the accompanying drawings:—Figure 1 is a view in elevation—parts being shown in section—of an apparatus for molding and pressing purposes according to my present invention. Fig. 2 is a view partly in elevation and mainly in vertical section taken through the center of the apparatus in a direction at right angles to Fig. 1. Fig. 3 is a plan view of Fig. 1. Fig. 4 is a plan view with the mold table removed and Fig. 5 is a vertical sectional view on an enlarged scale showing the compressing apparatus.

Similar letters of reference indicate corresponding parts throughout.

a is a horizontally rotating mold table of the well-known type provided with a series of pockets and molding chambers a' therein—which may if desired be provided with dies to produce briquets of any desired form or size. This horizontal rotatable mold table a is moved around step by step in any known or suitable manner for example as illustrated said mold table may be provided on the under side with a ring of bevel teeth a^2 which engage with a bevel toothed wheel a^3 (see Figs. 1 and 3) which latter in turn is operated by ratchet wheel a^4 fixed on the spindle a^5. This ratchet wheel carries a pawl or pawls which in one direction engage and rotate the wheel a^3 and in the other direction move idly over same, and said ratchet wheel is reciprocated by means of the connecting rod b which latter at one end b' is pivoted to said ratchet wheel (see Figs. 1 and 3) and at the other end is connected at b^2 to the crank b^3 on the main shaft c. This mold table is moved around step by step in the known manner and no claim is made herein to either the mold table *per se* or the method of operating same.

Any suitable means may be employed for filling the molds or mold chambers a' in the mold table a and as such means of filling said molds in briquet presses are well-known and in common use therefore it is not necessary to further describe same here.

The aforesaid shaft c is operated from any suitable source of power as for example said shaft c may be operated by means of a belt on the fast and loose pulleys d which rotate the shaft d' and the latter through a worm d^2 rotates the worm wheel d^3 on said shaft c.

Directly underneath the point in the apparatus where the pressure is to be applied

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to the material to be compressed in the mold I arrange the hydraulic cylinder e of any suitable type, advantageously a cylinder of large bore compared with the length of stroke, the length of stroke of the ram in said cylinder being arranged according to the distance which the latter has to travel in order that the required amount of pressure upon the material may be produced. Means are arranged to admit water to this cylinder first from any suitable source where the water is under little or no pressure or even during the first part of the movement which is imparted mechanically to the ram (as hereinafter described) the water may be drawn into the cylinder if desired the object being in all cases to employ water during this period of the stroke at the minimum cost for the purpose of producing economy in the cost of the water used in the apparatus and then toward the latter part of the outward stroke of the ram water under high pressure or under any desired pressure is admitted to the cylinder in order to produce the desired amount and extent of hydraulic pressure for the last part of the outward stroke of the ram: the arrangement for the aforesaid independent water supplies as shown in the drawings being as follows:—f is a water tank from the lower part of which the water flows through a non-return valve f' and pipe f^2 and passage z into the cylinder. g is the high pressure water inlet pipe from which the high pressure water is led through the valve g' and pipe g^2 to the said passage z in the cylinder e. h is the return pipe through which the water from the cylinder e is returned to the tank f namely on the instroke of the ram the water in the cylinder e is forced out through the passage z pipe g^2 valve g' and pipe h to the tank f. The ram i operating in said cylinder e carries and has fixed or formed thereon on its upper part a frame k which in the central part thereof is hollowed out or cut away in the manner indicated at k'. Through this space k' in the central part of said frame k the shaft c passes and at this point said shaft c is provided with a cam l which latter when rotated into the upper position rides against and acts on the cam piece or tongue m and when rotated into the lower position acts upon the bottom surface k^2 of the hollowed out portion of the frame k. This cam-piece or tongue m is located and held in position between the cheek plates m' m' and is slotted at m^2 and has a guide-pin m^3 passed therethrough—see Figs. 1 and 5. The upper part of this frame or device k terminates in a fork or branch arms k^3 the upper edges of which latter bear against the underside of corresponding downwardly projecting forks or branch arms n' of the plunger n which latter fits in and is adapted to reciprocate in the mold or mold chamber a'; in the arrangement shown a separate plunger n is provided in and for each said molding chamber a' respectively. In the lower part of each plunger n between the forks n' an anti-friction roller n^2 is journaled so that after the compression stroke imparted to said plunger n has taken place the latter on the next step-movement of the mold table a, is moved over the lower part of the inclined plane o, and as the table travels farther around step by step and the roller n^2 is thereby moved up the inclined plane o thus as will readily be seen the molded briquet is forced upward and out of the mold chamber a' by the upward movement thus imparted by the inclined plane o to the plunger n and the molded briquet is then removed off the mold table in any known or suitable manner.

After the fuel material has been filled into the mold the latter may either pass under a fixed block or plate in alinement with the ram i and plunger n operated thereby so that the material will be compressed against such fixed block or plate as in the known forms of briquet presses with horizontal rotary mold table, or (in place of such fixed block or plate) I may employ a movable block p as illustrated in the drawings. This said block p being carried by the powerful lever p' which latter is pivoted at p^2 to a fixed part of the apparatus and at its other end this lever p' is suitably connected at the point q' (*e. g.* a universal or knuckle joint) to the rod q which is operated by the eccentrics q^2 on the shaft c. The said block p must be so mounted on the lever p' that it will approach (and if desired) enter each mold chamber a' after the latter is moved into position under it so that such block p will form the top of the mold during the compression of the material and thereafter will be moved clear of the mold table and molded briquet before the next step movement is imparted to the mold table a. The operative face of this block p may be of any suitable form or if desired may be provided with any device symbol or trade mark to be imparted to the briquet in molding same and similarly the opposite side of the briquet may have any desired form or (and) mark, etc., imparted thereto by means of the top end of the plunger n or by means of a die plate s such as shown in Fig. 5.

The valve controlling the high pressure water supply to the cylinder e is automatically operated at the required moment when the ram i and frame k have been mechanically moved to the desired point and similarly said water supply is automatically cut off by any suitable mechanical means, as for example by a cam or eccentric on the shaft c, operating such high pressure water valve at the required moment or by any suitable tap-

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pet motion or the like operated by the shaft c for example the valve g' (for controlling the high pressure water supply and the escape of water from the cylinder e) may be operated, as illustrated by the tappet arm t which at one end is rigidly attached to the cam piece or tongue m and at the other end t' is provided with an eye through which is passed the spindle g^3 on which are fixed adjustable tappets g^4 whereby the said valve is operated.

The operation of the apparatus is as follows:—As each mold chamber a' arrives under the block p the lower end of the plunger n in said chamber is brought into position over and in vertical alinement with the frame k and ram i (all in vertical alinement) see Figs. 1 2 and 5 and at this moment the cam l is in its lower position as indicated in said figures. The rotation of the cam l (by the shaft c) now raises the cam piece or tongue m and the latter acting on the frame k forces upward said frame k and ram i attached thereto for such part of the travel of the ram i as may be desired during the pressure stroke for example in the arrangement illustrated the frame k together with the ram i will be mechanically moved (by said cam action) through the greater part of the compression stroke viz. about three-fourths or four-fifths of said stroke and during this mechanical movement of the ram i water at little or no pressure is caused or permitted to enter the cylinder e from the cistern f so that said cylinder is thus filled with water during the outward mechanical movement of the ram i and at or toward the end of this mechanical outward movement (during which the fuel material has been partly compressed) the tappet arm t then operates the valve g' and admits high pressure water to the cylinder e so that the outstroke of the ram i is now completed by hydraulic pressure and the final compression thereby imparted to the material in the mold chamber a' and this hydraulic pressure on the fuel material is maintained and allowed to dwell thereon for a certain period viz. during the time the cam l is revolving from its uppermost position into such a position as will permit the cam-piece to descend to such an extent as to cause the tappet arm t to close the valve g' from the high pressure supply and permit the escape of the water from the cylinder e through the passage z the pipe g^2 the valve g' and pipe h to the cistern f. After thus cutting off high pressure water and opening the exhaust or escape from the cylinder e the cam l by acting on the plate k^2 in the bottom of the opening k' in the frame k causes or assists in causing the descent of the ram i whereby the water is forced out of the cylinder e as aforesaid back into the cistern f whence it can be used again as before described. The rotary mold table a is now moved on a step and the next filled mold chamber a' and plunger n is brought into position over and in vertical alinement with the aforesaid frame k and ram i and the pressure applied directly first mechanically and then hydraulically as hereinbefore described; and so on. It will thus be seen that by my invention the hydraulic pressure is not merely applied for an instant only or like a blow but is allowed to dwell upon the fuel material for an appreciable time during which as compression of the fuel material is effected the hydraulic pressure is fully maintained until the high pressure water is cut off. Thus it will be seen that according to the present invention the stroke of the hydraulic ram is variable owing to the adjustable and elastic limits of the mechanical device and of the fuel material or other materal to be compressed.

It will be obvious that my aforesaid invention may be adapted to be carried into practice or use—with or without modifications as may be required—for compressing different material such as ores or minerals (or materials containing ores or minerals) to be compressed into briquets, or for making clay or earthenware articles, such as tiles, etc.

Instead of employing a rotating table containing a series of molds or molding chambers, my present invention may be carried into practice in conjunction with any other suitable form and arrangement of mold or molding chamber, as for instance, I may employ a reciprocating table slide or device containing the molds or molding chambers, or I may employ only a single mold or molding chamber.

What I claim is:—

1. In an apparatus for molding and compressing purposes, the combination of a rotatably mounted table provided with a series of molding chambers, a plunger adapted to operate in the molding chambers, a slidably mounted frame located in alinement with the plunger, said frame being provided with an opening, a revoluble shaft passing through said opening, a cam fixed on the shaft and adapted to force said frame upwardly for a part of the compression stroke of the plunger, a piston at the lower end of said frame, a cylinder for the piston, and means controlling the flow of water under pressure to the cylinder to complete the compression stroke of the plunger.

2. In an apparatus for molding and compressing purposes, a rotatably mounted table provided with a series of molding chambers, a plunger adapted to operate in the molding chambers, a slidably mounted frame located

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in alinement with the plunger, said frame being provided with an opening having upwardly converging sides, a V-shaped member mounted in the upper portion of said opening, a revoluble shaft passing through the opening, a cam on the shaft in engagement with the V-shaped member adapted to lift the plunger for a part of its compression stroke, a piston at the lower end of said frame, a cylinder for the piston, and means for controlling the flow of water under pressure to the cylinder to complete the compression stroke of the plunger.

3. In an apparatus for molding and compressing purposes, a rotatably mounted table provided with a series of molding chambers, a plunger adapted to operate in the molding chambers, a slidably mounted frame located in alinement with the plunger, said frame being provided with an opening having upwardly converging sides, a V-shaped member mounted in the upper portion of said opening, a revoluble shaft passing through the opening, a cam on the shaft in engagement with the V-shaped member adapted to lift the plunger for a part of its compression stroke, a piston at the lower end of said frame, a cylinder for the piston, and an arm extending from the V-shaped member for opening a high pressure valve to permit water to enter the cylinder for completing the compression stroke of the plunger.

4. In an apparatus for molding and compressing purposes, a rotatably mounted table provided with a series of molding chambers, a plunger adapted to operate in the molding chambers, a slidably mounted frame located in alinement with the plunger, said frame being provided with an opening having upwardly converging sides, a V-shaped member mounted in the upper portion of said opening, a revoluble shaft passing through the opening, a cam on the shaft in engagement with the V-shaped member adapted to lift the plunger for a part of its compression stroke, a piston at the lower end of said frame, a cylinder for the piston, an arm extending from the V-shaped member for opening a high pressure valve to permit water to enter the cylinder for completing the compression stroke of the plunger and to close said valve when the plunger has finished its stroke, and means for permitting the escape of the water from the cylinder.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JAMES JOHN SHEDLOCK.

Witnesses:
LORIN A. LATHROP,
ALBERT S. PHILLIPS.