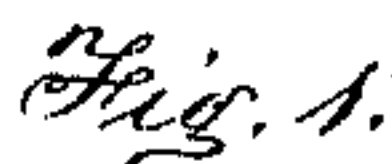


2. Streets. Sheet. 1.

*Compacting Coal in Lumps.*

No. 97309.

*Patented Nov. 30. 1869.*



Benjamin  
Wm. H. Morrison

To Mitchell Eng

T. M. Mitchell,

2. Sheets, Sheet 2.

Compacting Coal in Lumps.

No. 97,309.

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Fig. 3.

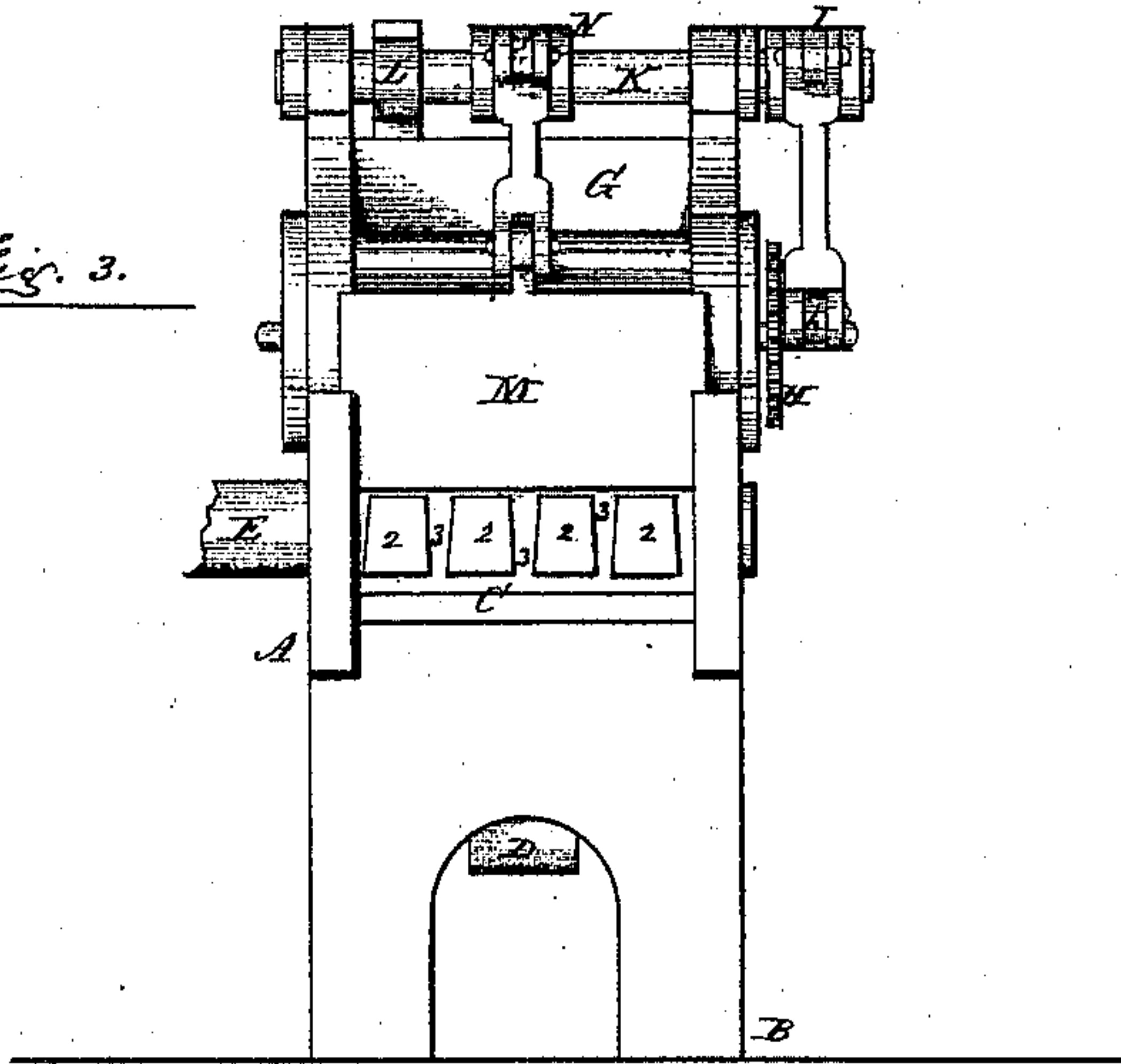
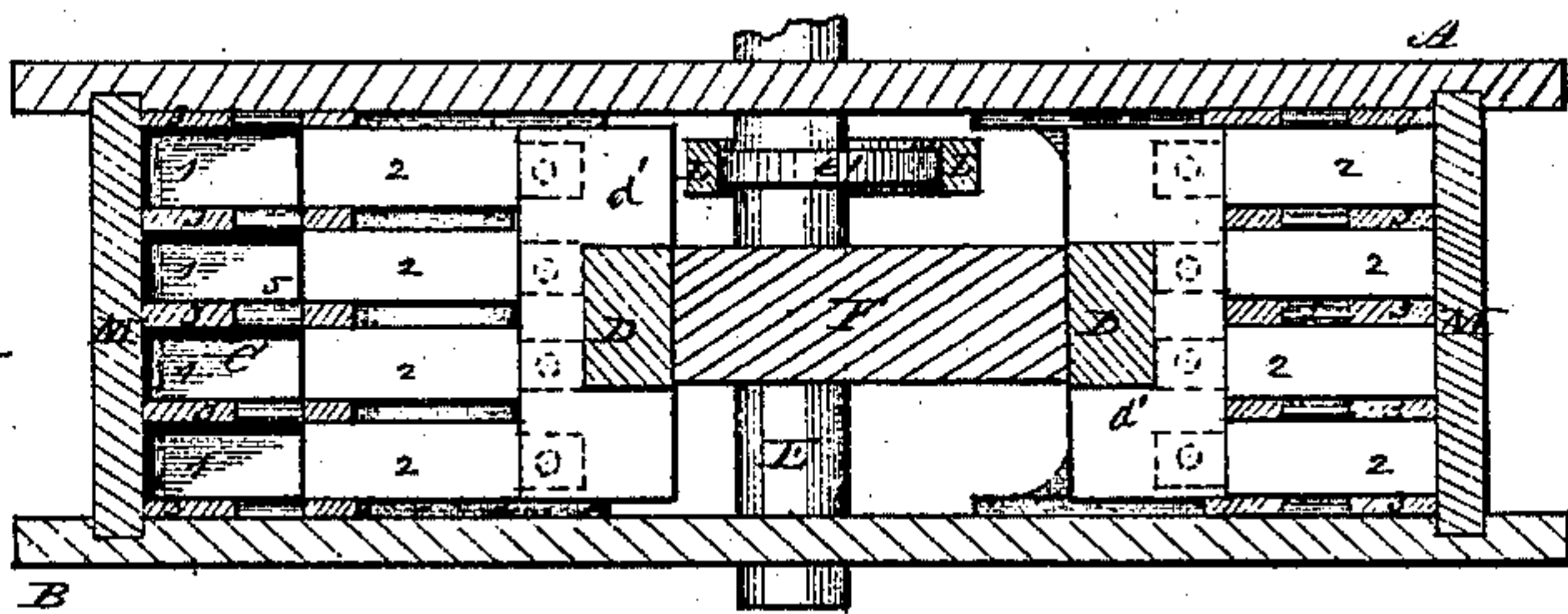


Fig. 4.



Witnesses:

Wm. Morrison

Wm. H. Morrison.

T. M. Mitchell, Eng.



# United States Patent Office.

T. M. MITCHELL, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 97,309, dated November 30, 1869.

## IMPROVEMENT IN PRESSES FOR COMPACTING THE WASTE PARTICLES OF COAL INTO BLOCKS FOR FUEL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, T. M. MITCHELL, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in the Press for Compacting the Particles of Waste Coal into Blocks or Lumps for Fuel; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of the said improved press;

Figure 2, a longitudinal vertical section;

Figure 3, an end elevation; and

Figure 4, a horizontal section below the dotted line *v w* of fig. 1.

Like letters and numbers of reference indicate the same parts when in the different figures.

After the waste coal has been washed, screened, and mixed with the proper cementing-material in a heated condition, substantially as is described in my other specifications, (divisions O and B,) the plastic mass is to be divided and compacted into solid blocks or lumps, suitable for fuel; and

The object of the present improvement is to afford a press of more simple construction, that will produce the result automatically, in a more rapid, effective, and perfect manner.

The nature of my invention consists in the peculiar construction, arrangement, and mode of operation of certain mechanical devices hereinafter described and pointed out.

Referring to the drawings—

A B is the stationary supporting-base of the machine.

C C are horizontally-placed bed-plates, in the two respective ends of the machine, which support the bottoms of two series of moulds 1-1.

D, a yoke, connecting rigidly together two head-pieces *d' d'*, which slide on suitable guides, and have adjustably fixed in each head a series of removable or changeable plungers, 2-2, constructed and arranged to correspond and operate in connection with the respective series of moulds 1-1, during the reciprocating movements of the said sliding heads, as will hereinafter be explained.

The moulds 1-1 are formed by casting the bottom of each series of the same, with a series of upright partitions, 3-3, having their sides or faces slightly sloped toward the bottoms of the moulds; and upon these partitions a covering-plate, 4, is secured, which has an oblong opening, 5, through it, which affords open communication between the mouths of said moulds and a hopper, G, above. The bottom plates

of the moulds, with their series of partitions, are cast together in one piece, substantially as described, for the purpose of being readily exchangeable for like moulds of other sizes, to be used in the same press, as the different sizes of the blocks or lumps of fuel in demand may require; and the partitions are sloped, for the purpose of facilitating the plastic mass in its passage down into the moulds.

Across the machine, at a point midway between its two ends, the driving-shaft E is secured, to rotate, and has fixed upon it a cam, F, which has three projecting knuckles, *f' f'' f'''*, of different lengths, each of which successively comes in contact with the two curved projections or swells, *d'' d''*, on the inner sides of the yoke D, during each complete rotary motion of the said shaft E, and, consequently, give simultaneous reciprocating motion to the yoke, with its sliding heads *d' d'* and plungers, 2-2.

Across over the upper or open side of each of the two series of moulds 1-1, is fixed the hopper G, for receiving the hot plastic mass which is to be compacted into blocks or lumps. The bottom side of each hopper opens directly into the oblong space 5 which results between its series of moulds 1 and their respective plungers 2, when the latter are in their farthest retracted position. (See figs. 2 and 4.)

Within a suitable cylindrical portion of each hopper G, there is a feeding-cylinder, *g'*, provided with radiating-plates 6-6, or "rakes," and arranged to rotate within the hopper, so as to carry downward, by a positive motion, the required portions of the hot mass above, into the oblong space 5, produced between the mouths of the moulds and their plungers.

Rotary motion is alternately given to the two feeding-cylinders, *g' g'*, by means of a ratchet-wheel, H, and a weighted pawl, *k*, which is articulated to one end of one of the short levers *h'' h''*, which turns on their respective journals, and are operated by the movements of the respective ends of an equal-armed overhead lever, I, to which the said short levers *h'' h''* are articulated. (See fig. 1.)

The lever I is fixed on one end of a rock-shaft, K, which is supported across on the upper part of the machine, in suitable bearings, and is also rigidly fixed in the upper end of a pendulous arm, L, the lower end of which arm having a yoke, which receives an eccentric, *e'*, which is fixed on the main shaft E, and thus pendulous or oscillating motions given to the arm, and, consequently, the vibratory motions to the lever I, whereby the alternate rotating motions required are given to the feeding-cylinders *g' g'*.

The outer, or discharge-ends of both series of the moulds 1-1 are alternately closed and opened by means of solid plates or gates M M, which are fitted to slide

\*Assignor to the Anthracite Fuel Manufacturing Company.



vertically and securely in close contact with the outer ends of said moulds, so as to alternately close and open the latter, as will hereinafter be described.

The alternating motions are given to the said gates or plates M M by means of an equal-armed overhead lever, N, the fulcrum of which is the shaft K, and to which it is rigidly fixed, and by which it is also vibrated simultaneously with the lever I.

To the respective ends of the said lever N, the gates or plates M M are suspended. (See fig. 2.)

#### Operation.

The hoppers G G being put in communication with a suitable "mixer," (see specification, division B,) and a constant supply of the hot plastic mass out of which the blocks or lumps of fuel are to be formed and pressed, (see specification, division C,) rotary motion is then given to the main shaft E, in the direction of the arrow, fig. 1, and, consequently, simultaneous revolving motions given to the eccentric  $e'$  and the knuckles  $f$   $f'$   $f''$  of the cam F. (See figs. 1 and 2.)

The cam and eccentric are so adjusted and fixed on the shaft E, that during the continuance of the rotary motion of the latter, and immediately after the longest knuckle  $f''$  has passed one of the swells  $d''$ , on the yoke D, and thus opened the mouths of the series of moulds in the opposite end of the machine, and the eccentric  $e'$ , having at the same time closed the outlet-ends of the same series of moulds, by lowering the gate or plate M at that end, as shown in fig. 2, the knuckle  $f'$  comes in contact with the swell on the other side of the said yoke D, and, passing over its surface, causes the series of plungers at that end of the machine to fill, and powerfully compact the contents of its respective series of moulds.

The shortest knuckle  $f$  now comes in contact with the swell  $d''$ , on the opposite side of the yoke D, and, passing over its surface, causes a partial withdrawal of the plungers which have just compacted the contents of the said series of moulds, and thus the closed gate M of said moulds, being relieved from the pressure incident to the compacting-operation just described, the eccentric  $e'$  moves the yoked arm L, and thus causes the lever N to raise the gate M, which covers the outlets of said moulds, the other end of said lever

N at the same time lowering the other gate, and thus closing its moulds.

The longest knuckle  $f''$  then comes in contact with the swell which the knuckle  $f'$  had just previously passed over, and, passing over its surface, pushes the series of plungers in that end of the machine through its respective series of moulds, and thus discharges the compacted blocks or lumps, which, being conducted by a receiving-chute or otherwise, fall into a suitable car, whereby they may be conveyed to a drying-oven. (See specification, division A.)

At the time the lever N causes the elevation of the gate M, the lever I causes the rotary motion of the nearest feed-cylinder  $g'$ , and thus insures a supply of feed to the oblong space formed between the plungers and the moulds by the retraction of the plungers, simple gravitation not always being reliable for filling the space closely.

The operations just described are repeated in regular succession at the other end of the machine during each full rotary motion of the shaft E, and, consequently, the machine may be called "a double-acting press."

I am aware that double-acting presses have long been used for different purposes, and that a patent was granted to John B. Collen, dated January 22, 1867, for a "machine for pressing manufactured fuel into bricks or blocks," the said machine being constructed and arranged to operate as a double-acting press. Therefore, I do not desire to claim, broadly, a double-acting press, nor anything described and shown in said patent; but, having fully described my improvement,

What I claim as new, and desire to secure by Letters Patent, is confined to the following, viz:

The combination of the overhead lever N, the yoked arm L, the eccentric  $e'$ , and the main shaft E, the said parts being constructed and arranged to operate together, substantially as set forth and described, for the purpose of raising and lowering the gates M M, in the manner described.

T. M. MITCHELL.

Witnesses:

BENJ. MORISON,  
WM. H. MORISON.