3 Sheets--Sheet 1.

J. J. ENDRES.

Machine for the Manufacture of Artificial-Fuel.

No. 162,363. Patented April 20, 1875.

Fig. 1.

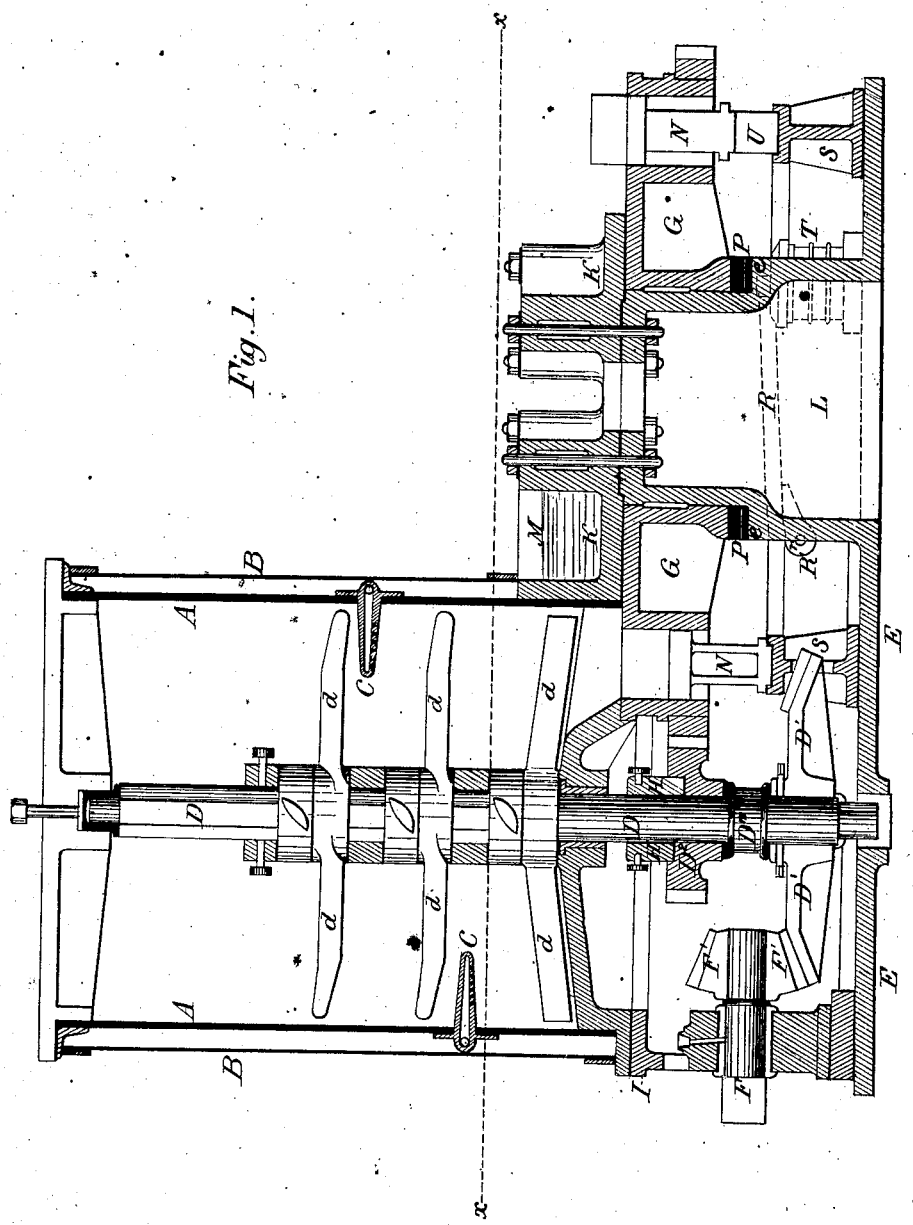

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Fig. 2.

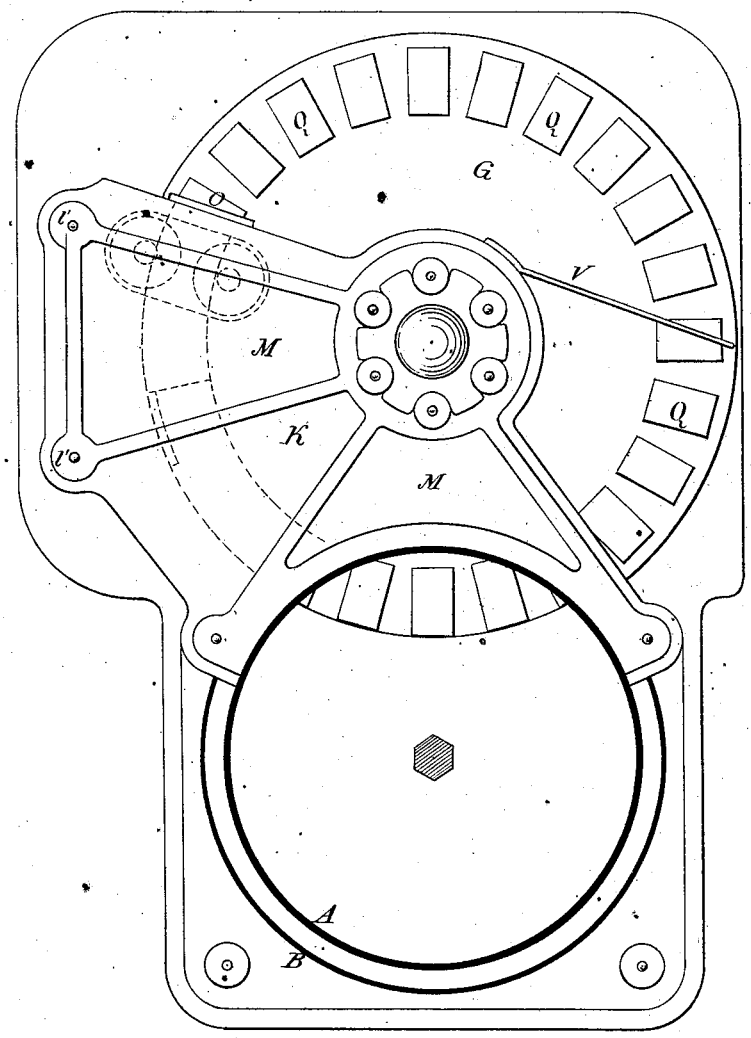

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Fig. 3.

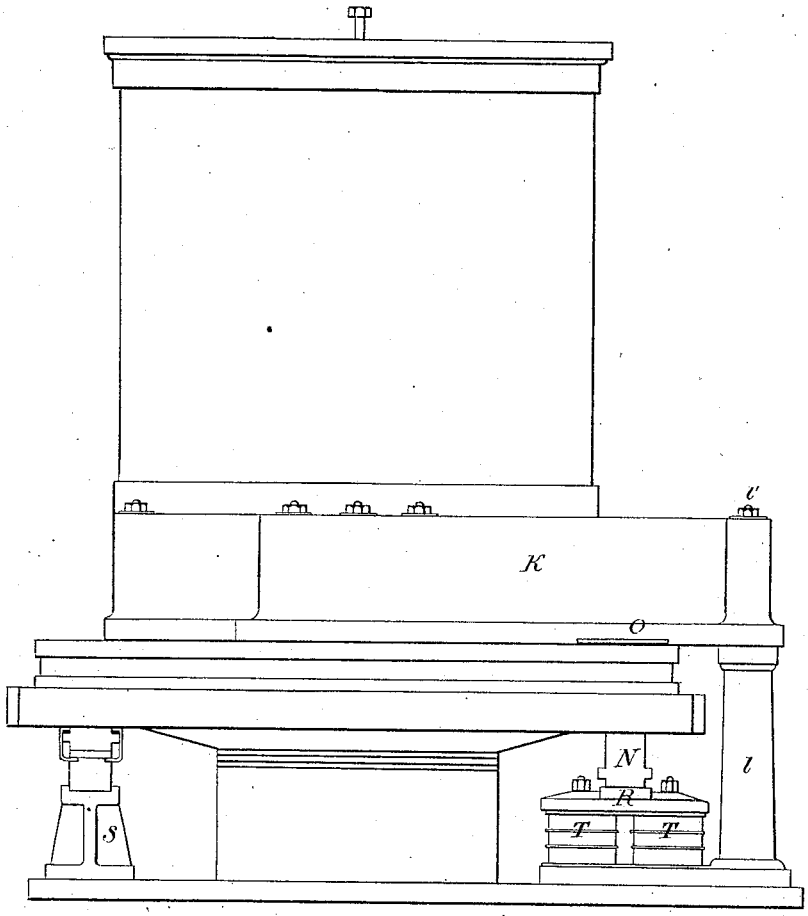
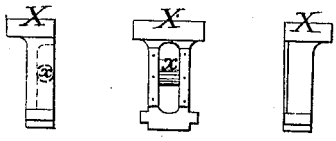


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN J. ENDRES, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF HIS RIGHT TO L. L. CROUNSE, OF WASHINGTON, D. C.

IMPROVEMENT IN MACHINES FOR THE MANUFACTURE OF ARTIFICIAL FUEL.

Specification forming part of Letters Patent No. **162,363**, dated April 20, 1875; application filed April 14, 1875.

To all whom it may concern:

Be it known that I, JOHN J. ENDRES, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in a Machine for Manufacturing Artificial Fuel; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a vertical central section. Fig. 2 is a partial plan and partial section on line *x x*. Fig. 3 is a view and partial section, representing more fully the manner of pressing and delivering the blocks of fuel. Fig. 4 are plungers, forming the bottom of the mold by which the pressure is applied.

The present invention relates to machinery used to agglomerate and press small coal into blocks of any desired shape or size, to be used as fuel. Its peculiar novelties and advantages consist, more especially, first, in the construction of an apparatus in which the material is heated by a surrounding steam-jacket, and the introduction of numerous jets of highly superheated steam from nipples set on the inside of the cylinder, which penetrates the mass while it is being mixed and forced into molds to be pressed; second, the manner of supporting and working the mixer and mold-wheel; third, the circulation of water in the compartments, to prevent the overheating of the machinery by the close connection with the mixer, and the contact with the heated material; fourth, the adjustable and elastic support of the inclined segment, by springs of any desired shape or material; fifth, the plungers, with either brass sliding plates or rollers, to lessen any friction or binding in their vertical action; sixth, in the special construction and arrangements of the several parts of my machine, and in their combination to form the present operative apparatus, all as I will now more at length and specifically set forth.

In the accompanying drawings, A is the cylinder or mixer, receiving fine coal and coal-tar, pitch, or bitumen. To heat the mixture so as to effect the dissolving and most minute division of the bitumen, the cylinder is surrounded by a steam-jacket, B, and a number of stationary arms or nipples, C, projecting radially into the cylinder, introducing numerous jets of highly superheated steam into the material while it is being mixed and forced toward the discharge on the bottom by the revolving of the arms *d* on shaft D. This shaft extends through the bottom of the mixer to the main bed-plate E, receiving its motion from the shaft F by means of the bevel-wheels D′ and F′. The spur-wheel D″ on shaft D lies loose on the sleeve D‴, and transmits motion to the mold-wheel G when coupled by the sliding block H. The square frame I is the supporting-piece between the mixer and bottom bed-plate. The latter and the large pivot L, supporting the mold-wheel G, are one piece. This pivot extends through and fits well into the center hole of the mold-wheel, and carries the stationary pressure-plate K, which connects on one side with the mixer or inside cylinder A, and the square frame supporting it, and rests on the other side on two columns, having heavy iron rods *l l* inside, which, with the connection of pivot and central part of the plate, are well calculated to resist the pressure applied from below.

To prevent the overheating of the pressure-plate, from its close connection with the heated mixer and the contact with the hot material, water is made to circulate in the compartments M. For the purpose of lessening the friction of the material as it is pushed against the pressure-plate by the vertical action of the plungers N N, and enable the renewal or replacing at pleasure of the pressure-plate, a strip or plate of steel or brass, O, is inserted in the under surface of the pressure-plate, of a width sufficient to cover the molds Q in the wheel G. This mold-wheel, resting and turning on the rings P P P, fitting the shoulder *e* on the pivot, has any desired number of molds, arranged radially, and at equal distance. The molds are lined with steel or brass, like the pressure-plate, and for the same purpose. The mold-wheel reaches under and forms part of the bottom of the mixer, so as to bring, when in motion, the molds directly under the col-

umn of prepared material. The filling is assisted by the propelling action of the mixer-arms *d*, which turn faster than the table. The filled mold passes then under the pressure-plate, and the plunger begins gradually to rise by being driven up the incline R, and so compresses the material confined in the mold between the pressure-plate and the plunger. The incline is made of steel, and held on the lower end by an eye, R′, and pin *r* to the stationary ring S, while the other higher end rests on adjustable springs T, of any desired shape or material, the object being to have a yielding point in case an undue strain should endanger parts of the machinery, and also to have an easy adjustment, to vary the size and pressure of the block.

When the plunger has moved over the highest point of the incline R, it passes again on the stationary ring S, which is slightly lower at this point, to relieve the pressure on the block. The latter, passing from under the pressure-plate, is then elevated above the surface of the mold-wheel by the rising of the plunger, moving up incline U.

The hot pasty material discharged from the mixer into the cooler-molds soon loses its high temperature while being pressed and delivered from the molds, so that, owing to the prompt cooling of pitch having been under such high heat, the brick has become hard enough to be automatically removed from the mold-wheel by the stationary bar V upon an endless band, ready for use, shipping, or storing.

The plunger X may be of any usual or ordinary shape and construction, and may have rollers *x* in their faces, or metal plates, to prevent binding or friction.

After the block has left the table, the plunger is brought into its original position by stationary bars, and the mold returns under the mixer to receive a new charge, to be treated as before, so making the process continuous, automatic, and capable of producing, with this simple and compact machine, large quantities at small expense.

Having thus described my invention, what I consider new, and desire to secure by Letters Patent, is—

1. The mixer herein described, surrounded with a steam-jacket, in combination with perforated arms or nipples, for the introduction of jets of superheated steam, substantially as and for the purposes described.

2. The combination of the mold-wheel, supporting-pivot, and rings P, substantially as and for the purposes set forth.

3. The pressure-plate provided with water-circulation compartments, substantially as described.

4. The inclined segment, in combination with an elastic support, substantially as and for the purpose described.

5. The plungers provided with metal plates or rollers in their side faces, for the purpose of lessening the friction and binding, substantially as and for the purposes set forth.

6. The mixer, constructed as specified, in combination with the mold-wheel, pressure-plate, stationary ring, and adjustably-inclined segment, substantially as and for the purposes described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN J. ENDRES.

Witnesses:
DANL. TYLER,
PHILIP MCNICKLE.