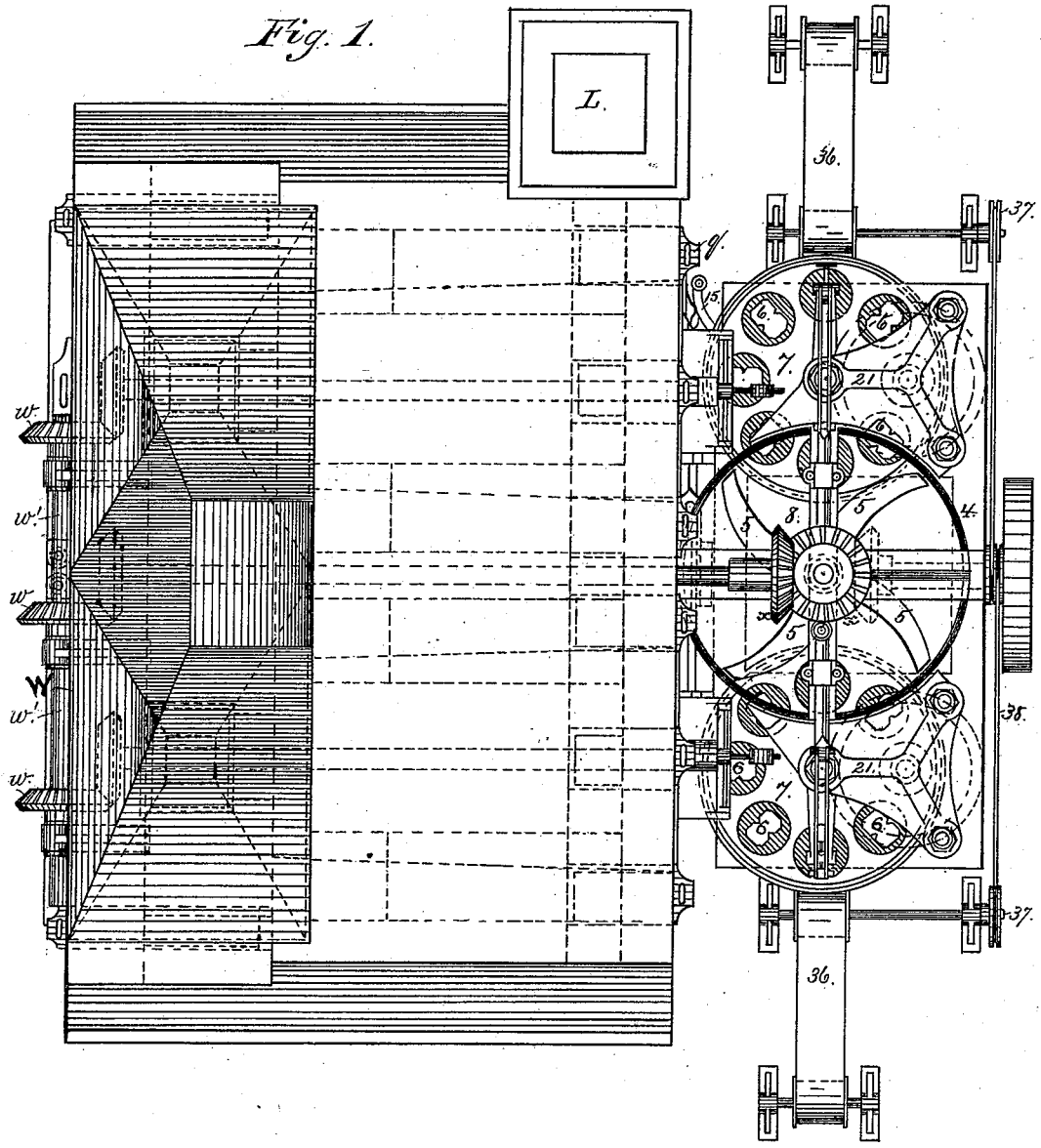
4 Sheets—Sheet 1.

# W. H. ROSEWARNE.

## Apparatus for Compressing Fuel.

**No. 208,929.** **Patented Oct. 15, 1878.**

*Fig. 1.*




Attest.
Walter Allen
G. T. Smallwood Jr.

Inventor:
W. H. Rosewarne
By Knight Bros Attys

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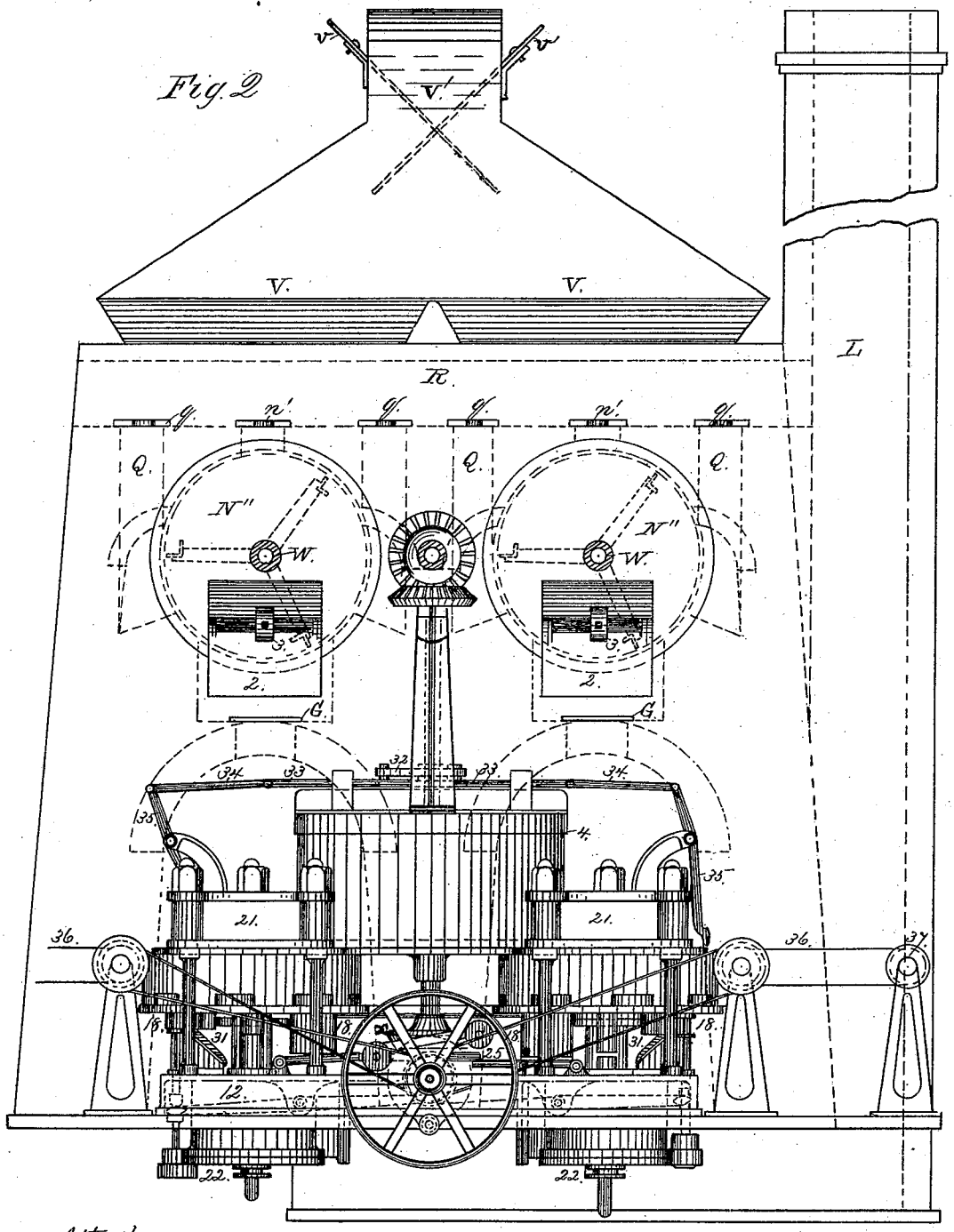
# W. H. ROSEWARNE.

## Apparatus for Compressing Fuel.

**No. 208,929.** **Patented Oct. 15, 1878.**

*Fig. 2*

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Geo. T. Smallwood Jr.

Walter Allen

Inventor

W. H. Rosewarne

By Knight Bros Attys

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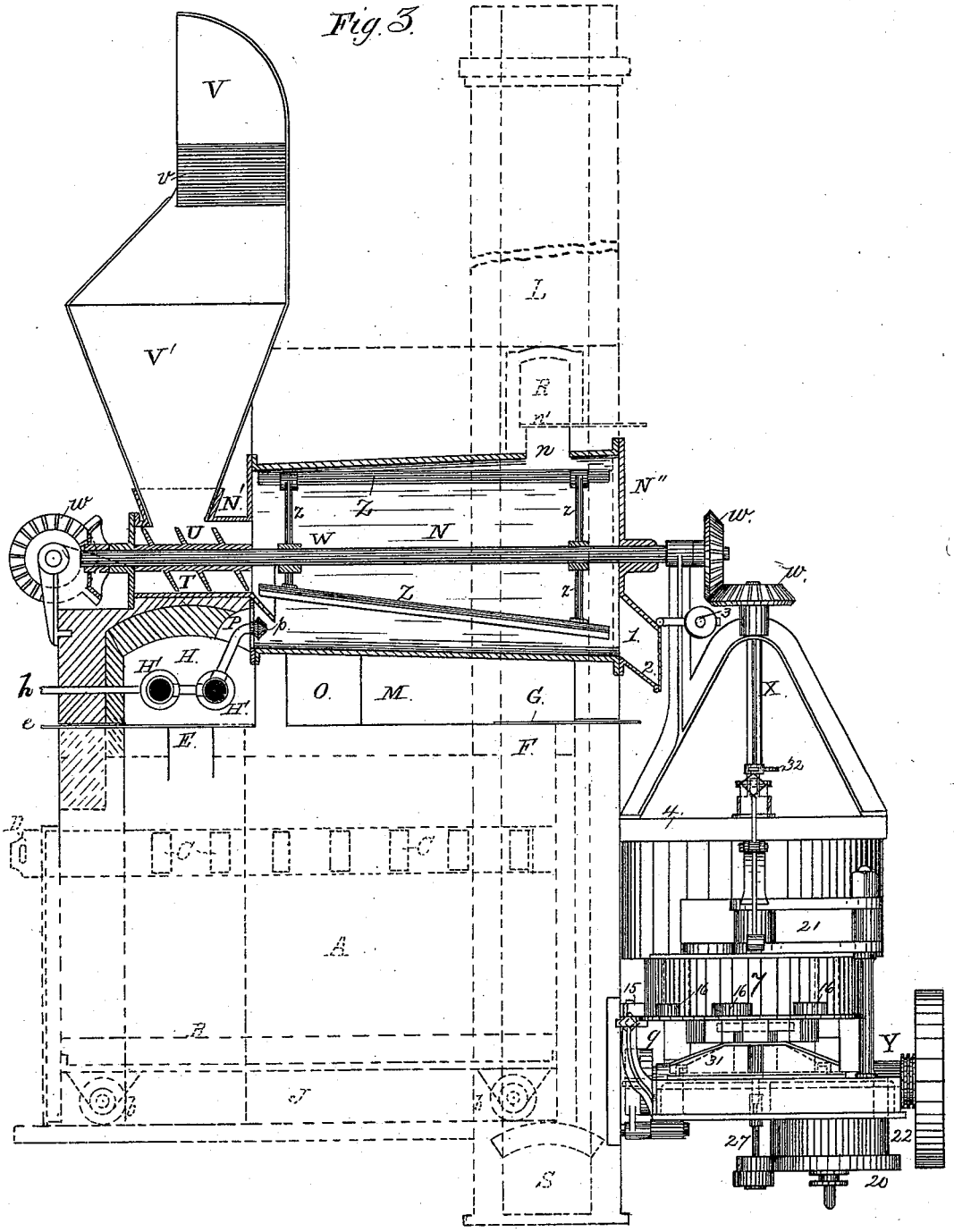
# W. H. ROSEWARNE.

## Apparatus for Compressing Fuel.

**No. 208,929.** **Patented Oct. 15, 1878.**

*Fig. 3.*




Attest.
Walter Allen
G. T. Smallwood Jr.

Inventor
W. H. Rosewarne
By. Knight Bros. Attys

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# W. H. ROSEWARNE.

## Apparatus for Compressing Fuel.

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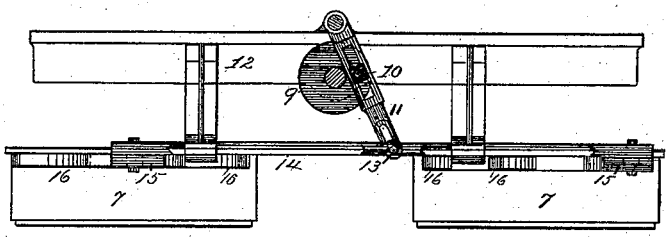

FIG 7.

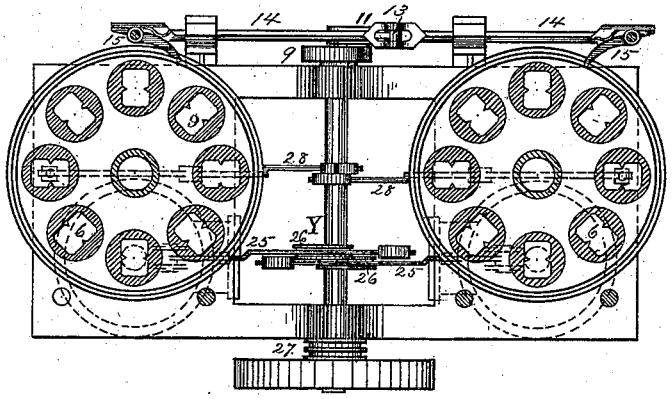

FIG. 6.

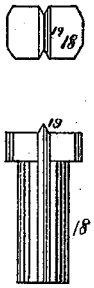

FIG. 9.

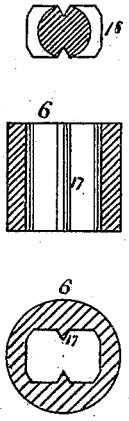

FIG. 8.

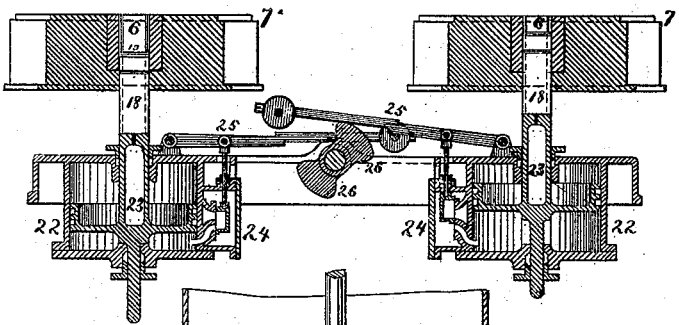

FIG. 5.

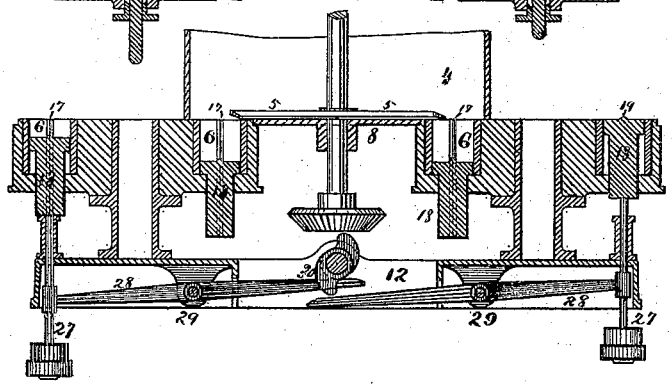

FIG 4.

Attest:
Walter Allen
Geo. T. Smallwood Jr.

Inventor
W. H. Rosewarne
By Knight Bros.
Attys.

# UNITED STATES PATENT OFFICE.

WILLIAM H. ROSEWARNE, OF CINCINNATI, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HIMSELF, DANIEL PHILLIPS, JOHN REES, AND MARGARET J. PHILLIPS, OF NEWPORT, KENTUCKY.

## IMPROVEMENT IN APPARATUS FOR COMPRESSING FUEL.

Specification forming part of Letters Patent No. **208,929**, dated October 15, 1878; application filed May 3, 1878.

*To all whom it may concern:*

Be it known that I, WILLIAM HENRY ROSEWARNE, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Apparatus for Compressing Fuel, of which the following is a specification:

My invention relates to certain machinery and apparatus by means of which slack or small coal is fused and pressed into molds, in order to convert it into a better form for fuel.

I prefer to use my apparatus in connection with coke-ovens, in order to utilize the burning gases given off from said ovens for heating the coal preparatory to molding the same.

The apparatus consists, essentially, of horizontal conical cylinders, through which the slack coal is fed, placed so as to be capable of being heated by the gases from a coke-oven or other means, and a suitable arrangement of molds and filling and discharging devices, for receiving the contents of the conical coal-heating cylinders and molding it into solid blocks.

To prevent the combustion of the fuel while passing through the cylinders, and also to assist in mixing it and rendering it more pasty, I introduce jets of superheated steam at the feed end of said cylinders.

In the accompanying drawings, the full lines represent the subject of the present application, the broken lines representing the subject-matter of another application filed by me.

Figure 1 represents a plan. Fig. 2 is an end view, showing the compressing apparatus. Fig. 3 is a vertical section, showing the coal-heating and the mixing apparatus. Fig. 4 is a vertical section of the mold-tables. Fig. 5 is a similar view of the compressing apparatus. Fig. 6 is a plan of the mold-tables. Fig. 7 shows the mechanism for rotating the mold-tables. Fig. 8 represents separate views of the molds. Fig. 9 represents sliding bottom of molds.

A represents one of two similarly-built coke-ovens, containing flues C, E, and H and dampers D and *e*, as fully described in another application for patent made by me.

In the rear of each oven an exit-flue, F, controlled by damper G, communicates above with a chamber, M. Over each of the chambers M is a coal-heating cylinder, N, which, in order to allow the easy passage of the coal, is made wider at the discharge than at the feed end. The gases ascending to chamber M are made to pass under the whole length of said cylinder, and thence up the side branches, O O, to side flues, P P, which conduct the gases back again to the rear end of the cylinder, whence they escape, through the uptakes Q Q, regulated by dampers *q q*, into the main flue R, extending across both ovens and entering at one end the stack L.

Two pipes, H′, in the flue H serve to superheat the steam passed through them previous to its being introduced through nozzles *p* into the cylinder, and a passage, *n*, controlled by damper *n′*, allows it to escape into flue R.

Attached to the cover or head N′, on the small end of the cylinder N, is a cylinder, T, containing a screw feeding device, U, for feeding the small or slack coal from hopper V into cylinder N. The two hoppers V V are provided with a distributing angle-plate, *v*, for dividing the coal as it descends chute V′, so as to give each hopper an equal charge. Each of the passages to the side of this plate can be closed at will by a sliding plate, *v′*, in order to cause all the coal to pass into one hopper, when desired.

The feeding-screw U is operated by the shaft W, which passes through the cylinder N, and is worked by bevel-gear *w*, shafts *w′ w′*, and vertical shaft X, that communicates by bevel-gear *x* with the main shaft Y. For mixing the coal and agglomerating material, and also to move it from the feed to the discharge end of the cylinder N, I provide specially-arranged angle-irons Z on radial arms *z*, secured to the shaft W. The larger head or cover N″ of the conical cylinder N is provided with a spout, 1, having a door, 2, held in position by weight 3, for discharging the contents of said cylinders into the distributing-pan 4. In the center of this pan works the vertical shaft X, to which are secured, at the bottom of said pan, four radial distributing-blades, 5, which serve to

force the coal into molds 6 in two circular mold-tables, 7, situated on either side of the distributing-pan 4. The top of each table 7 encroaches a sufficient distance on the bottom 8 of the distributing-pan 4 to allow the molds 6 in the former to be brought immediately under the distributing-blades 5 in the latter.

The tables 7 each contain eight molds, and are so geared that by each revolution of the main shaft Y they are rotated one-eighth of their circumference. This is done by a crank, 9, Figs. 6 and 7, on the main shaft Y, which operates, by pin and sliding block 10, the slotted lever 11, fulcrumed at one end to the bed-plate 12, and having on the other end a slot embracing a pin, 13, on a reciprocating rod, 14, on each end of which is a pawl, 15, that enters suitable ratchet-grooves 16, eight in number, in the side of the tables 7.

The molds 6 are removable for purposes of renewal or change of size, and are provided with angular ribs or projections 17, so as to mold the block into such shape that it may be easily split in two without being crumbled.

At one-quarter of the distance around the mold-tables 7 from the filling-pan 4 there is a steam or hydraulic press, 20, and its abutment 21, for compressing the fuel in the mold to a solid block. This press consists of a steam or hydraulic cylinder, 22, having a suitable piston rod or ram, 23, which, when in operation, presses against the lower ends of the mold-bottoms 18. The cylinder is provided with an ordinary slide-valve, 24, which is operated by a weighted lever, 25, raised by cam 26 on the main shaft Y.

The bottoms of the molds consist of solid iron plungers 18, capable of sliding vertically in the molds, for the purpose of compressing and expelling the block of coal. These bottoms are also provided with a rib, 19.

Under the tables 7, and opposite the distributing-pan 4, is a device for elevating the mold-bottom, so as to expel the compressed block, consisting of a weighted pushing-rod, 27, which impinges against the lower end of the plunger or mold-bottom, and is elevated by a lever, 28, fulcrumed to the bed-plate 12 at 29, and operated by cam 30 on the main shaft Y.

An inclined plane, 31, on the bed-plate 12 causes the mold-bottom to reascend into contact with the block of fuel previous to its being pushed upward by the rod 27.

Attached to the vertical shaft X, just above the distributing-pan 4, is a cam, 32, for reciprocating sliding rods 33 and connecting-rod 34, which operate the levers 35 for pushing the blocks of fuel onto the endless delivering-straps 36. The straps are operated from the main shaft by pulleys 37 and belts 38.

The operation is as follows: After the cylinder N has been heated sufficiently the machine is operated, and the hoppers V V charged with coal and suitable agglomerating material, such, for instance, as tar or pitch, which are steadily forced into the cylinder *n* by screw U, and there thoroughly mixed by wings Z, and fused into a pasty mass of about the consistency of dough. Steam is admitted through pipe *h* to superheating-pipes H′ H′, and then injected by nozzle *p* into the cylinder N, where it serves to prevent the combustion of the fuel and to assist in mixing the mass. The steam is allowed to escape from the cylinder by opening the damper *n′*.

By the continual rotation of the spiral wings Z, and owing to the conicity of the cylinders N, the fused mass is gradually forced through the spouts 1, into the distributing-pan 4, where it is forced by the blades 5 into the molds 6. The tables 7 7 are then rotated by eighths until the filled mold comes immediately over the ram of the press. The cam 26 then depresses the lever 25 and opens the valve of the press, whose ram 23 then rises and lifts the mold-bottom, compressing the fuel to a solid block. The ram then returns to its original position, allowing the mold-bottom to sink again, while the compressed block of coal remains in the upper portion of the mold. Upon further rotation of the table the mold-bottom is made to ascend the incline 31 until it again impinges on the block, and when the mold arrives at the point diametrically opposite the place where it was filled the cam 30, acting on lever 28, elevates the rod 27, which, impinging on the lower end of the mold-bottom, raises the same and forces the block of fuel out of its mold. Immediately after this ejection of the block, and before the mold-tables have begun to move again, the cam 32 on the vertical shaft X operates the mechanism 33, 34, and 35, and pushes the block onto the endless belt 36, which carries it to any desired place. The operation of filling, pressing, and discharging go on simultaneously in each table.

The conical form of the coal-heating cylinders N prevents all possibility of clogging or choking, which has heretofore been so frequent in machines of this character.

I claim as new and of my invention—

1. In a compressed-fuel apparatus, the coal-heating cylinders N, formed in a conical shape, as and for the purpose set forth.

2. In combination with coke-ovens A A, the cylinders N, heated by the burning gases from said ovens, for the purpose of fusing small coal with suitable agglomerating material preparatory to its being molded into blocks for fuel.

3. The conical coal-heating cylinder N, provided externally with flues O O P P Q Q, conveying waste heat from the coke-ovens, and internally with revolving spirally-arranged bars Z, as and for the purpose set forth.

4. In combination with the coal-heating cylinder N, the screw-feeding device U.

5. In combination with the compound apparatus for compressing fuel, the hoppers V V and distributing angle-plate *v*, for the purpose set forth.

6. In combination with the ovens A A and coal-heating cylinders N N, the superheating

steam-pipes H′ H′, nozzle *p*, and flue H, as and for the purpose set forth.

7. In a compound apparatus for compressing fuel, the two mold-tables 7 7, with ratchets 16, pawls 15, rod 14, lever 11, and crank 9, for intermittently rotating the same.

8. In combination with the mold-tables 7 7 and sliding mold-bottoms 18, the weighted rods 27, levers 28, and cams 30, for discharging the molds.

9. In combination with the mold-tables 7 7, the oscillating lever 35, reciprocating rods 27, and cams 32, for removing the blocks of fuel.

In testimony of which invention I hereunto set my hand.

WILLIAM HY. ROSEWARNE.

Attest:

WALTER KNIGHT,

RANKIN D. JONES.