C. W. BEEHLER.

METHOD OF SEMI-COKING COAL DUST, COAL SLACK, AND THE LIKE.

APPLICATION FILED JULY 26, 1906.

955,310. Patented Apr. 19, 1910.

2 SHEETS—SHEET 1.

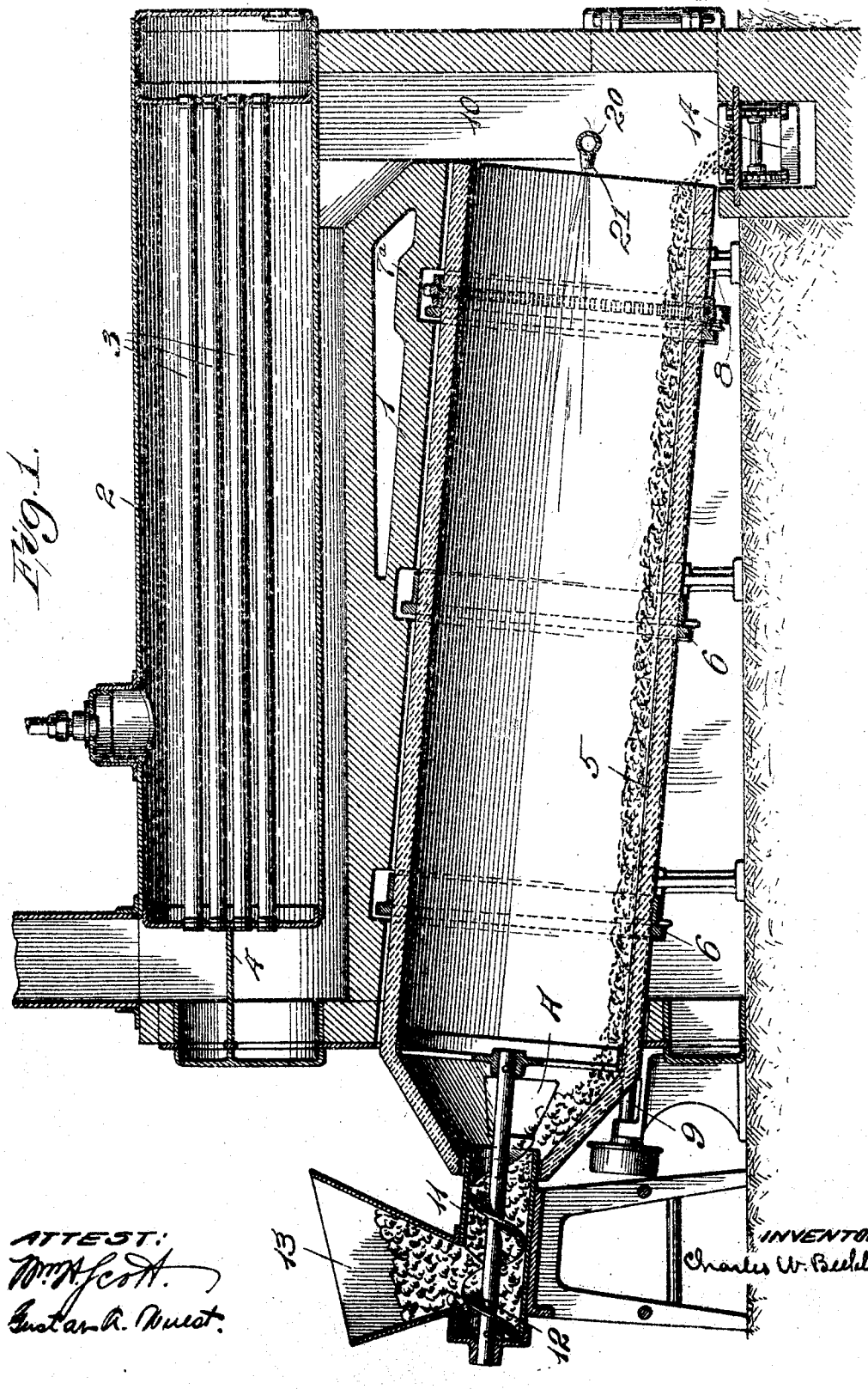

Fig. 1.

ATTEST:
Wm. A. Scott.
Gustav R. Wurst.

INVENTOR:
Charles W. Beehler

C. W. BEEHLER.

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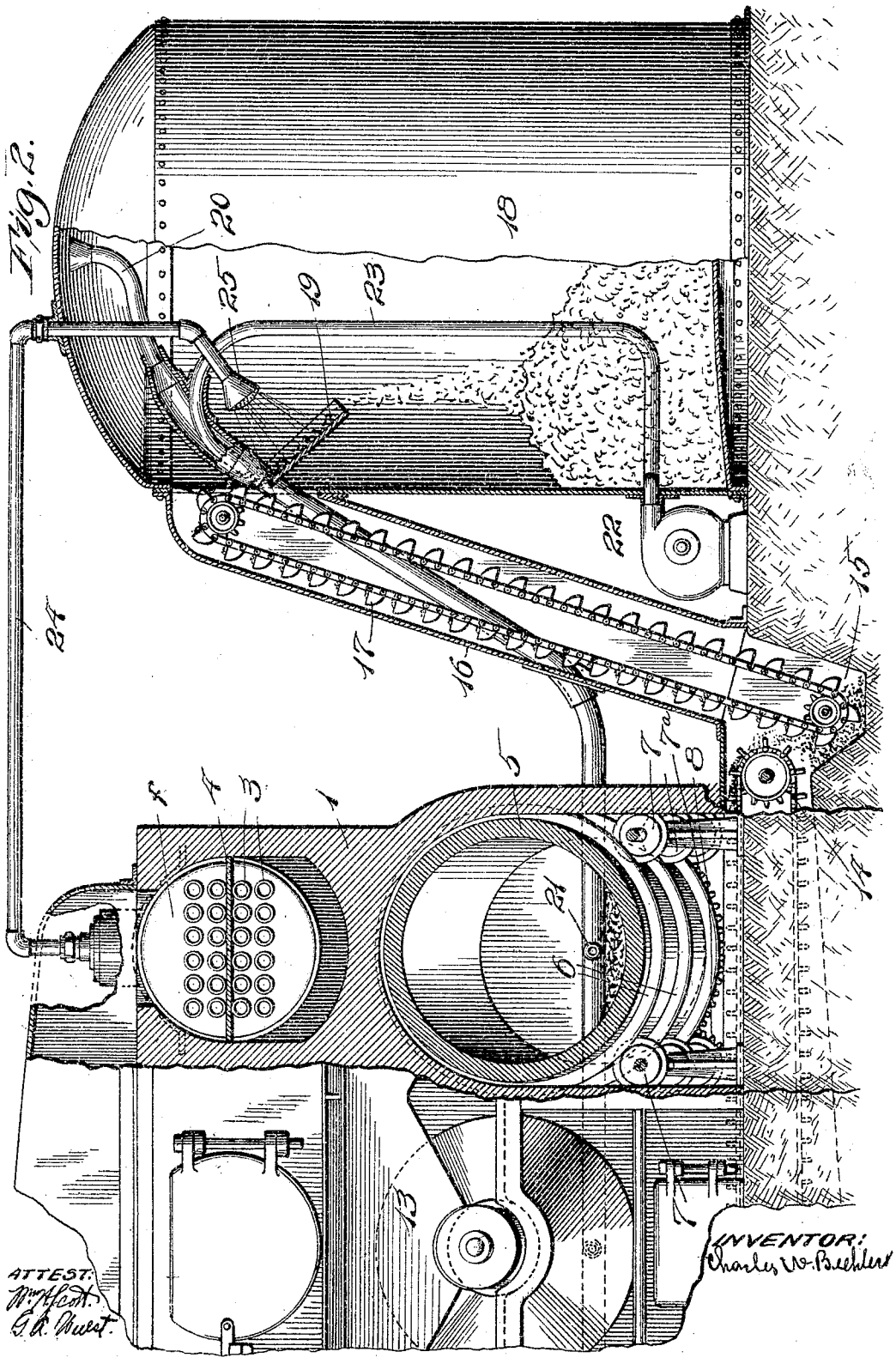
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES W. BEEHLER, OF ST. LOUIS, MISSOURI.

METHOD OF SEMICOKING COAL-DUST, COAL-SLACK, AND THE LIKE.

955,310. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed July 26, 1909. Serial No. 509,566.

To all whom it may concern:

Be it known that I, CHARLES W. BEEHLER, a citizen of the United States, and resident of St. Louis, Missouri, have invented a certain new and useful Improvement in the Method of Semicoking Coal-Dust, Coal-Slack, and the Like, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming a part of the specification, in which—

Figure 1 is a vertical section taken through the center of a portion of an apparatus utilized for carrying out my improved method. Fig. 2 is a front elevation, partly in section, of the apparatus used for carrying out my improved method.

My invention relates to a new and improved method of semi-coking coal dust, coal slack and the like, the principal object of my invention being to reduce coal dust, coal slack and the like to a state of semi-coke to be used as fuel, and the heat necessary for the operation or action of semi-coking being generated from the gases arising from the coal dust and slack during the semi-coking process.

By my improved method I am able to produce at a low cost a marketable fuel from coal dust, coal slack and the like, which latter product can be very cheaply obtained at coal mines, as said dust and slack is usually unmarketable and therefore of little value.

Briefly stated, my invention consists in passing coal dust, slack or the like, through retorts which are heated to a high degree, and during the passage through said retorts the coal dust and slack "balls" or forms into small lumps of approximately an inch or two inches in diameter; at the same time, these balls are reduced to semi-coke, the heat necessary for the semi-coking process being obtained from the gases arising from the heated coal dust and slack, and also from steam jets thrown onto the semi-coked material while the same is still in a heated condition.

In carrying out my improved process, I prefer to use one or a number of kilns or furnaces 1, in the upper end of each of which is a boiler 2 provided with a series of flues 3, and located immediately in front of each boiler is a baffle plate 4 which separates the lower series of flues from the upper series.

Arranged in the lower portion of each furnace or kiln is an inclined retort 5, the rear end of which is lower than the front end, said retort being provided with rings 6 which ride on rollers 7 supported on suitable bearings in the base of the furnace or kiln. One of these rings is provided with a circular rack 7^a, with which meshes a pinion 8 carried by a shaft 9, and which latter is driven in any suitable manner. The rear end of the retort is open, and a flue 10 at the rear end of each furnace establishes communication between the rear end of the retort and the rear portion of the boiler setting immediately above said retort. The forward end of the retort is in conical form, and leading thereinto is a horizontally disposed cylinder 11, in which operates a feeding device in the form of a spiral conveyer 12, which latter is carried by and rotates with the retort 5. Arranged above the cylinder 11 and communicating therewith, is a hopper 13 into which the coal dust, slack, or other material is fed. Arranged for operation immediately below the lower end of the retort is a transversely disposed conveyer 14 which discharges into a boot 15, and leading upward from said boot is a housing 16 in which is arranged for operation a bucket conveyer 17 driven in any suitable manner. The upper end of the housing 16 communicates with the upper portion of a container 18, and fixed on the interior thereof, beneath the upper end of the conveyer 17, is an apron 19.

Leading from the interior of the container 18 at the extreme upper end thereof is a pipe 20, which leads to and extends transversely across the rear open ends of the retorts 5, and projecting from said pipe 20 into the retorts are jet tubes 21.

Located adjacent the container 18 and driven in any suitable manner, is an air pump or fan 22, and leading therefrom into the pipe 20 is a pipe 23.

Leading from the steam dome of the boiler 2 into the upper portion of the container 18 is a steam pipe 24, the end of which is provided with a perforated head 25, which is so arranged as to discharge jets of steam directly onto the apron 19.

In carrying out my improved method

with the apparatus shown and described, coal dust, slack, or the like, which has preferably been dampened with salt or lime water, is delivered to the hopper 13, and as the retort 5 is rotated, the spiral conveyer 12 will feed the material into the upper end of the retort. The retort is rotated at the proper speed, and the coal dust or slack will gradually move toward the rear lower end of said retort, and during its travel therethrough, the dust or slack will "ball" or form into small bodies, which are anywhere from one-half to two inches in diameter. At the same time, the dust and slack will be semi-coked by reason of the high degree of heat maintained within the retort, which heat is devloped by the combustion of an inflammable gas discharged from the jet tube 21 and combined with the inflammable gas arising from the material undergoing the semi-coking process. The gas discharged from the jet tube 21 is generated by the jets of steam which discharge from the perforated head 25 onto the heated "balls" of semi-coked material passing over the apron 19, and which gas arises to the top of the container 18, whence it is drawn through the tube 20 by the siphonic action due to the discharge of a jet of air from the end of the pipe 23 in the pipe 20, which jet of air is obtained by means of the air pump or fan 22. The semi-coked material in ball form discharges from the rear end of the retort 5 onto the conveyer 14, whence it is carried into the boot 15, and thence elevated by means of the conveyer 17 and discharged therefrom onto the apron 19, where it is subjected to the jets of steam, thereby generating an inflammable gas. The excess heat from the retort 5 passes upward through the flue 10 beneath the boiler 2, thence backward and forward through the flues 3 in said boiler, and thus said heat is utilized for generating steam in the boiler, which steam can be utilized for operating the retort's conveyers, and for generating the inflammable gas within the container 18.

In starting the apparatus to carry out my improved method, the interior of the retort 5 is heated to the required degree by suitable fuel in the form of oil or gas delivered through an opening A in the front end of the retort, and which opening is afterward closed.

My improved method can be practiced by a number of different forms of apparatus other than the particular form herein shown and described.

Thus it will be seen how I have provided an improved method or process whereby coal dust, coal slack, and the like, may be semi-coked, and therefore transformed into a marketable product in a simple and inexpensive manner, and in which process the necessary heat to accomplish the semi-coking action is obtained from the coal dust or slack during its passage through the retort.

I claim:

1. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in placing coal dust or slack in a chamber heated by gas generated from the coal dust or slack under treatment, and then rotating said chamber until the coal dust or slack forms into balls.

2. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the dust or slack through a rotating chamber heated by gas generated from the coal dust or slack under treatment, and maintaining the dust or slack in said rotating chamber until said dust and slack forms into balls.

3. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the dust or slack through a chamber to cause said dust and slack to form into balls, and then subjecting the balls of semi-coked dust and slack to steam jets to obtain an inflammable gas to be utilized in heating the dust and slack in the container.

4. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the dust or slack through a rotating retort to semi-coke said material and cause the same to form into balls, then subjecting the semi-coked balls of material to jets of steam within the container to develop an inflammable gas, and which gas is conveyed to the interior of the retort.

5. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the coal dust and slack through a rotating chamber to semi-coke the material and cause the same to form into balls which chamber is heated by an inflammable gas generated from the semi-coked material after it has passed through said chamber, combined with gas arising from the material during the process of semi-coking.

6. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the coal dust and slack through a chamber to semi-coke said material and cause the same to form into balls which chamber is heated by an inflammable gas generated from the semi-coked material after it has passed through said chamber, combined with gas arising from the coal dust and slack while the same is in the chamber.

7. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the coal dust and slack through a chamber heated by gas generated by subjecting the semi-coked material to jets of steam after its passage through the cham-

ber, and which steam is generated by the excess heat developed within the chamber.

8. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the coal dust and slack through a rotating retort to cause said dust and slack to become semi-coked and to form into balls, and subsequently subjecting the balls of material while in a heated condition to the action of steam jets for generating an inflammable gas which is conveyed to and burned within the retort.

9. The herein-described method of semi-coking coal dust, coal slack, and the like, which consists in passing the coal dust and slack through a rotating retort to cause said dust and slack to become semi-coked and to form into balls, conveying the material in ball form into a container, then subjecting said material to the action of steam jets to generate an inflammable gas, and then conducting said inflammable gas to the interior of the retort.

10. The herein described method of semi-coking coal dust and coal slack, and the like, which consists in placing the coal dust and slack in a heated chamber and then continuously rotating said chamber until the coal dust and slack are semi-coked, and are formed into balls.

11. The herein described method of semi-coking coal dust and coal slack and the like, which consists in placing coal dust and slack in an inclined chamber, and then slowly rotating said chamber and then heating said chamber to such a degree as to cause the coal dust or slack to become semi-coked and to form into balls.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 16th day of July 1909.

CHARLES W. BEEHLER.

Witnesses:
HY. G. OHEIM,
JACOB F. SCHARR.