March 25, 1958 A. K. STRONG 2,828,026

RETORT SYSTEM AND PRESSURE FEEDER THEREFOR

Filed Sept. 22, 1954 2 Sheets-Sheet 1

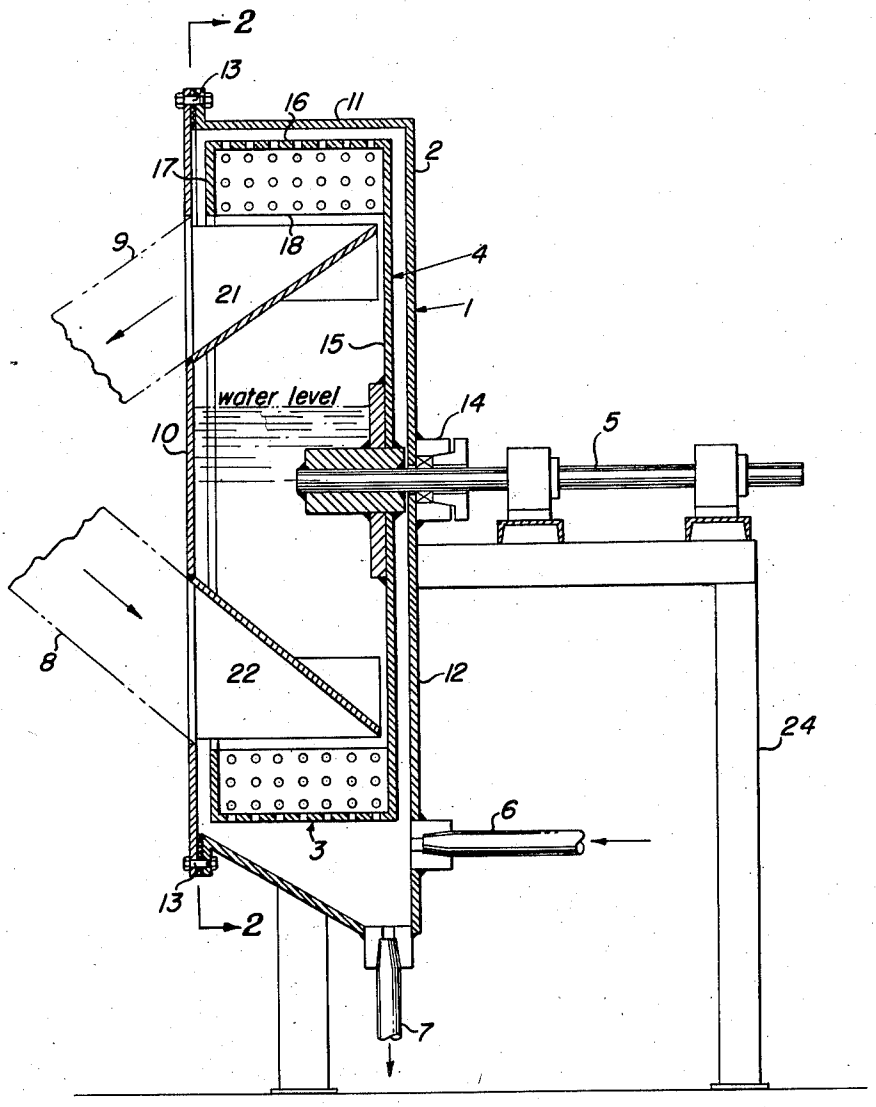


FIG. 1

INVENTOR.
ALLEN K. STRONG

BY

Wm. P. Spielman

March 25, 1958 A. K. STRONG 2,828,026

RETORT SYSTEM AND PRESSURE FEEDER THEREFOR

Filed Sept. 22, 1954 2 Sheets-Sheet 2

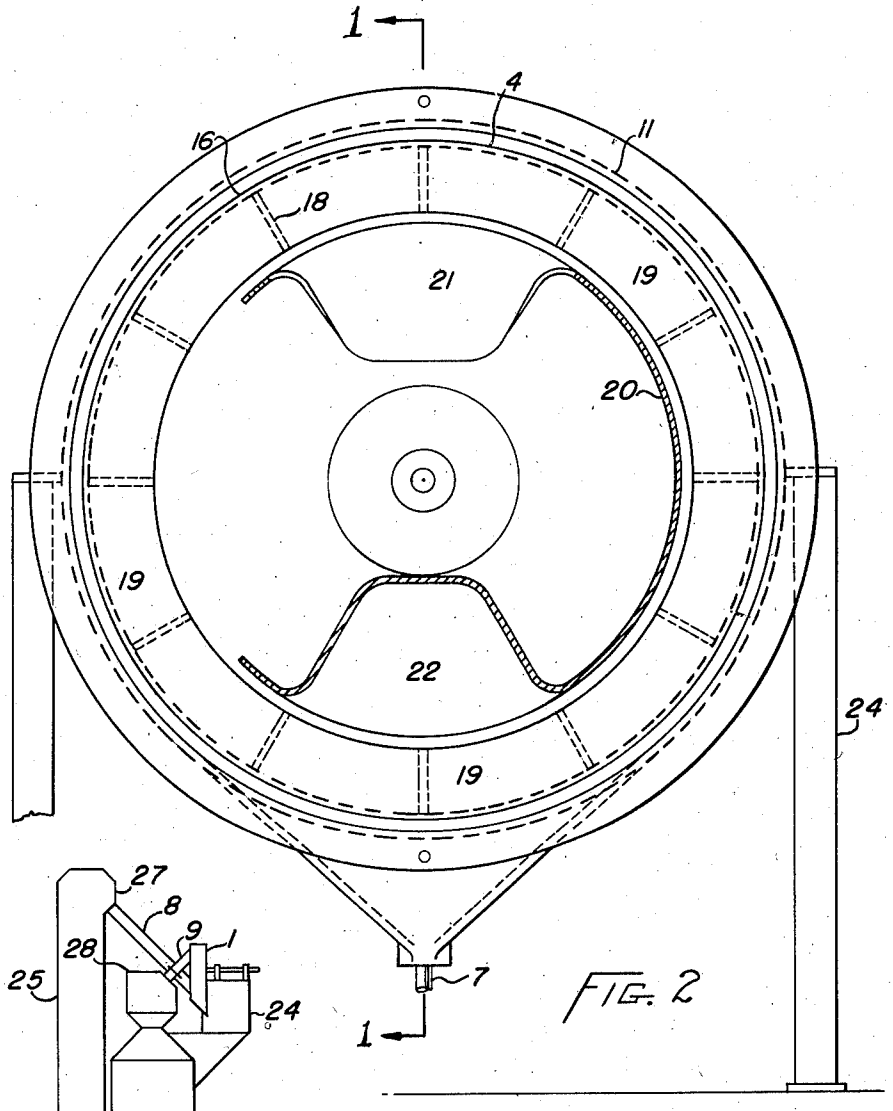


FIG. 2

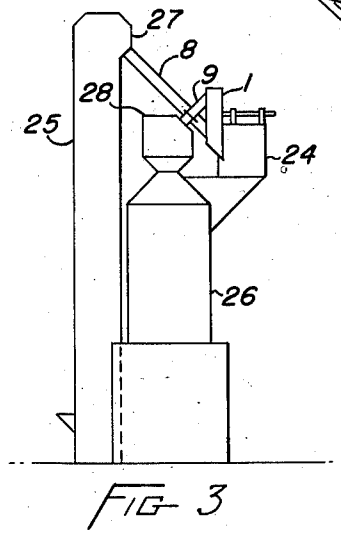


FIG. 3

INVENTOR.
ALLEN K. STRONG
BY
Wm. P. Spielman

United States Patent Office 2,828,026 Patented Mar. 25, 1958

2,828,026

RETORT SYSTEM AND PRESSURE FEEDER THEREFOR

Allen K. Strong, Larchmont, N. Y., assignor to American Cyanamid Company, New York, N. Y., a corporation of Maine

Application September 22, 1954, Serial No. 457,595

3 Claims. (Cl. 214—17)

This invention relates to a system for supplying solid feed material such as coal briquettes, ore particles and the like to a retort operating under superatmospheric pressure, and to an improved feeding mechanism for use in such a system.

In a number of chemical and metallurgical processes such as the digestion of copper-bearing ores, the calcination or coking of coal briquettes and the like the autoclave, retort or other reaction vessel is operated under a substantial superatmospheric pressure which may amount to several atmospheres. The continuous feeding of solid materials into such retorts while maintaining the pressure therein has presented serious problems. It is a principal object of the present invention to provide a retort system wherein the pressure of the retort is counterbalanced or maintained by the hydrostatic head of a sealing liquid in a standpipe through which the solid material is discharged by gravity into and through a feeding mechanism which will meter accurately the quantity of solid material being fed into the retort. A further object is the provision of a metering feeder for this purpose which is simple in construction, positive in action and in which a sealing liquid can readily be maintained at a suitable level. Further objects will become apparent from the following description of a preferred embodiment of the invention when taken with the appended claims.

With the above and other objects in view the invention consists, therefore, in the combination of apparatus arrangements hereinafter described with reference to the accompanying drawings and in the system of operation resulting therefrom.

The invention will be described with reference to the accompanying drawings wherein:

Fig. 1 is a vertical section on the line 1—1 of Fig. 2 showing a pressure retort feeder constituting an embodiment of the invention.

Fig. 2 is a section on the line 2—2 of Fig. 1 in the direction of the arrows, and

Fig. 3 is a side elevation of a retort, feeder and briquette elevator showing the complete retort system of the invention.

Referring to Fig. 1 the feeding and metering mechanism indicated by reference numeral 1 consists generally of a closed housing 2, constructed to maintain a gas-tight seal against its pressure of operation, a bucket elevator 3 which is preferably in the form of a rotatable drum 4 suitably mounted on a horizontal shaft 5 and an inlet pipe 6 and an outlet pipe 7 for maintaining a sealing liquid at a suitable level within the housing. An inlet pipe 8, which also serves as a standpipe for maintaining the desired hydrostatic pressure, and an outlet pipe 9 for feeding the metered solid material into the retort by gravity are attached to a side plate 10 of the housing 2 by welds or other suitable pressure-resistant joints.

The housing 2 consists preferably of a stationary drum having a cylindrical outer wall 11, a radial side wall 12, and the removable side plate 10 containing the inlet and outlet pipes 8 and 9 referred to above. As is shown

on Fig. 1 of the drawings, the plate 10 is preferably removably attached to the cylindrical outer wall 11 by bolts 13, a suitable gasket being provided to assist in maintaining the pressure. The shaft 5 passes through the central portion of the radial side wall 12, a suitable packing seal 14 being provided to prevent leakage and the drum 4 is attached at its axis to the inner end of the shaft 5 and is rotatable therewith.

The drum 4 is preferably made up of a radial disk 15 terminating at its outer edge in a rim 16 that is turned inwardly opposite the disk 15 in a flange 17. A series of partitions 18, preferably radial, are mounted across the interior of the drum adjacent the rim 16 from the flange 17 to the corresponding portion of the disk 15 and form therewith a set of elevator buckets 19. As is shown on Fig. 1 of the drawings, both the outer rim 16 and the partitions 18 are foraminous to facilitate drainage of the buckets as they rise above the level of the sealing liquid.

A baffle 20, welded to the cover plate 10 of the housing and removable therewith, is adjacent the inner edges of the buckets 19 on the rising side thereof, and is concentric with the elevator drum 4. This baffle terminates at its upper portion in a trough 21 that is aligned with the outlet pipe 9 and at its lower portion in an inverted trough 22 in alignment with the inlet pipe 8. The trough 21 serves to transmit solid material emptied from the buckets 19 into the outlet pipe, while the lower trough 22 assists in guiding solid material from the inlet pipe 8 into the buckets at their lowermost position.

In order to maintain a seal against the escape of pressure through the mechanism a suitable sealing liquid such as water, aqueous salt solutions, diphenyl and the like is admitted through the pipe 6, preferably to a level slightly above the axis of the drum. This level may be maintained constant by a ball and valve level control mechanism, which is not shown. It will be understood that while the liquid level in the feeding standpipe 8 may be the same as the liquid level in the housing 2 it is usually substantially higher, being raised by the operating pressure of the autoclave which is transmitted as gas pressure through the outlet pipe 9 to the surface of the liquid. A drain pipe 7, controlled by a valve that is normally closed, permits drainage of the housing at periodic intervals to prevent the accumulation of sludge. If desired, a continuous flow of water or other liquid may be maintained through the pipes 6 and 7 and its temperature may be regulated for the purpose of heating or cooling the feed material. The entire feeding and metering mechanism is mounted on a rigid framework 24 and the shaft 5 is rotated by a suitable variable speed driving mechanism which is not shown.

The operation of the retort system of my invention will be readily understood from a consideration of Fig. 3 of the drawings. The system consists essentially of an elevator 25 for raising the solid feed material to a sufficient height to preserve the requisite hydrostatic head, the feeder 1 which has just been described, and a retort, autoclave or other pressure reactor 26 which is below the level of the feeder and adapted for gravity feed therefrom. The inlet pipe 8, or standpipe, extends from a lower portion of the feeder 1 to the elevated source of solid feed material 27, as shown, and the sealing liquid in the feeder may rise in this pipe to whatever level may be necessary to counterbalance the operating pressure of the retort. The solid feed material falls by gravity through this liquid down the standpipe 8 into the buckets 19 of the feeder; it is then elevated through the sealing liquid by the rotation of the drum 4 until it is discharged into the trough 21 above the level of this liquid. This trough directs it into the outlet pipe 9, from which it is preferably discharged into a reservoir 28 that is maintained under the operating

pressure of the retort. Since the buckets 19 are of equal capacity, and since the speed of rotation of the drum 4 is controlled, the feeding device 1 functions as an accurate meter to measure and control the rate and quantity of solid feed material that is fed into the retort.

From the foregoing description it will be seen that all of the objects of the invention are accomplished by the described embodiment thereof. It will be understood, however, that modifications and substitutions of equivalents may be resorted to within the scope of the appended claims; thus, for example, another type of bucket elevator could be substituted for the rotating drum 4 without departing materially from the broad scope of the invention.

What I claim is:

1. A retort system comprising in combination an elevated source of solid feed material, a feeder below the level of said source and a retort below said feeder and adapted for gravity feed therefrom, said feeder comprising a closed housing having a standpipe leading from said elevated source of feed material to a lower portion thereof and an outlet pipe connecting an upper portion thereof to said retort, a liquid seal in said housing and means for elevating solid feed material from said standpipe through said liquid and discharging it into said outlet pipe.

2. A retort system comprising in combination an elevated source of solid feed material, a feeder below the level of said source and a retort below said feeder and adapted for gravity feed therefrom, said feeder comprising a closed cylindrical housing having a standpipe leading from said elevated source of feed material to a

lower portion thereof and an outlet pipe connecting an upper portion thereof to said retort, a liquid seal in said housing, and a cylindrical bucket elevator mounted axially in said housing and adapted upon rotation to elevate solid feed material from the standpipe through said liquid and discharge it into said outlet pipe.

3. A pressure retort feeder comprising in combination a closed cylindrical housing having a horizontal shaft rotatably mounted axially therein, a rotatable drum having a foraminous rim in said housing and attached at its axis to said shaft, partitions across the interior of said drum adjacent said rim and forming therewith a set of elevator buckets, a stationary baffle in said housing concentric with the rising side of said rim and adjacent said buckets and terminating in a trough under their uppermost position for transmitting solid material therefrom to an outlet in said housing, means for admitting solid material to the lower part of said housing above the lowermost position of said buckets, and means for admitting a sealing liquid to said housing.

References Cited in the file of this patent

UNITED STATES PATENTS

1,464,511	Stott	Aug. 14, 1923
2,370,950	Gibb et al.	Mar. 6, 1945
2,453,458	Reed et al.	Nov. 9, 1948
2,547,015	Kirkbride	Apr. 3, 1951
2,772,224	Shea	Nov. 27, 1956

FOREIGN PATENTS

346,866	France	Dec. 13, 1904