

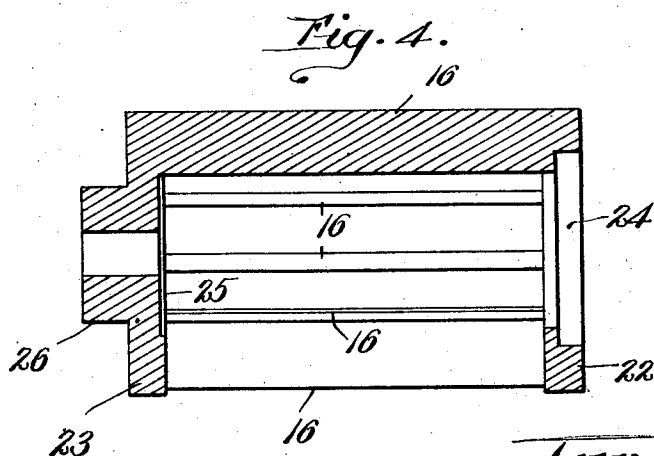
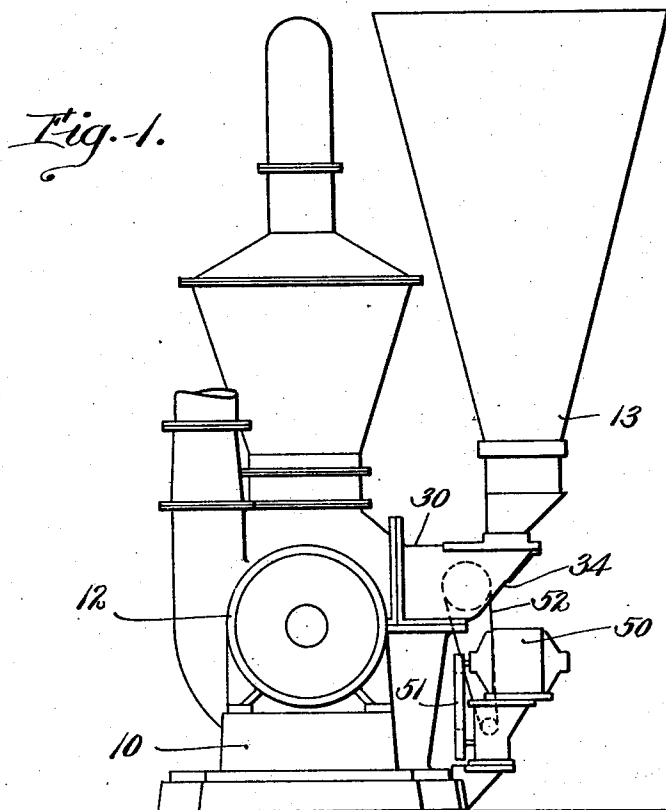
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C. CORLISS

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APPARATUS FOR FEEDING COAL AND LIKE MATERIAL

Filed June 29, 1929 2 Sheets-Sheet 1



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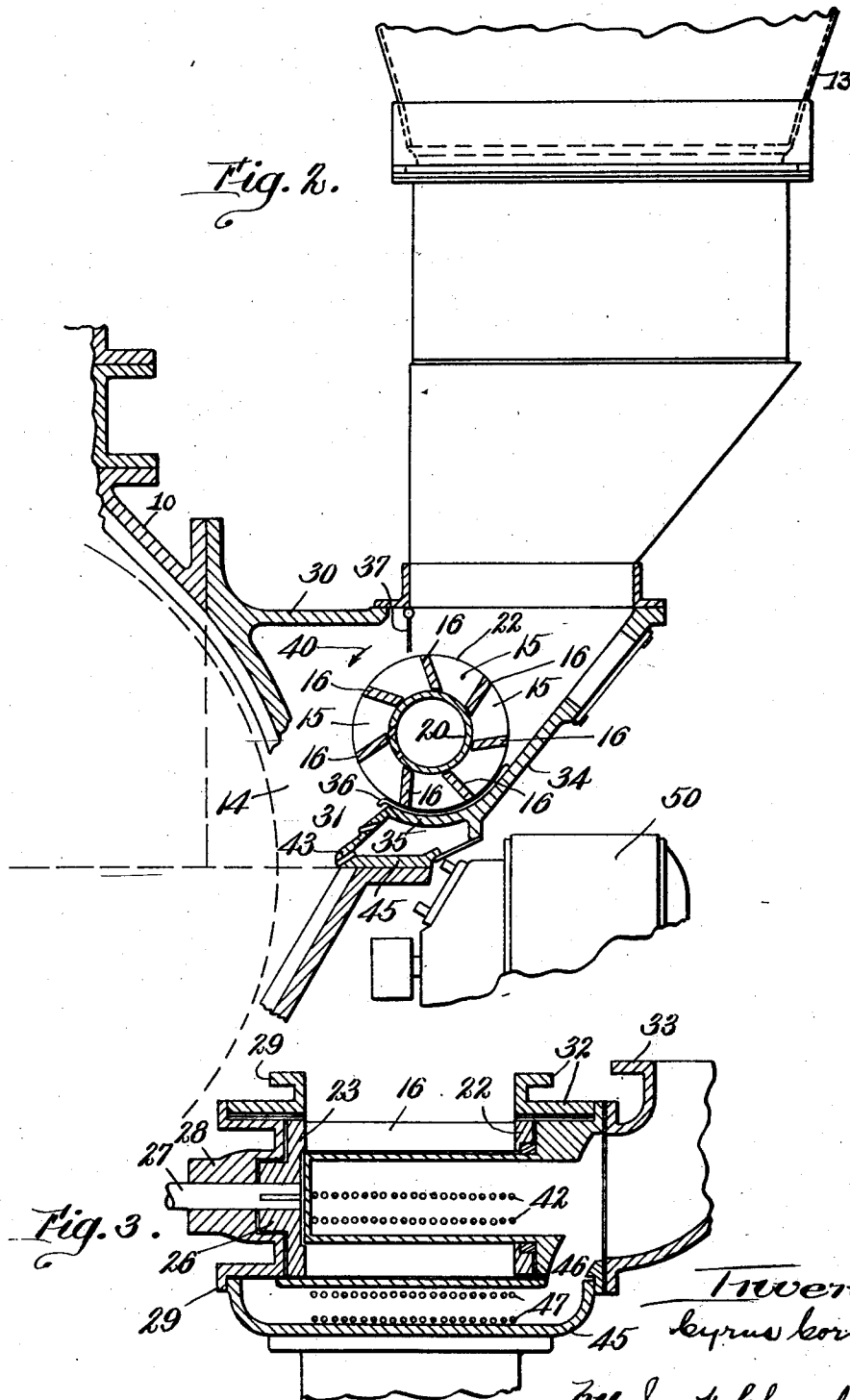
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UNITED STATES PATENT OFFICE

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APPARATUS FOR FEEDING COAL AND LIKE MATERIAL

Application filed June 29, 1929. Serial No. 374,663.

This invention relates to apparatus for feeding coal and like materials and especially for feeding soft coal from a hopper to a mill for pulverizing the coal into a finely divided state preparatory to feeding the same to a boiler, furnace, or the like.

The invention has for its object to provide a simple and efficient apparatus for feeding the coal to the pulverizing mill, and to this end, the apparatus is provided with a rotatable bucket member having a plurality of buckets which are open at their outer ends and co-operate with the hopper to be loaded with coal or other material by gravity through said open outer ends, to carry the load in each bucket to the pulverizing mill and discharge the load by gravity through the open outer ends of the buckets and said buckets have co-operating with them means for assisting gravity in discharging the load from the buckets.

The rotatable bucket member may and preferably will be provided with buckets which are also open at their inner ends and are mounted upon an axially arranged closure member for the inner ends of said buckets, said axial closure member co-operating with the inner ends of the buckets to maintain them closed from a position in which they are loaded by gravity through the open outer mouths into a position wherein they are unloaded by gravity through said open mouths, and also to facilitate discharge of the coal by gravity from the buckets, as will be described.

The axial closure member may be made as a solid axis or shaft or as is preferred it may be made as a hollow shaft or pipe into which air or other fluid under pressure is admitted and from which said air passes through outlet ports, which are arranged to communicate with the inner ends of the buckets when the latter are in their discharging position.

When the axial closure member is made hollow and provided with air outlet ports, it is preferred to provide for the use of additional air jets external to the hollow closure member to assist in feeding the coal into the mill, as will be described.

The improved feeding apparatus is particularly adapted for feeding soft coal containing more or less moisture, as it prevents clogging of the inlet port of the mill, and thereby avoids interruption of the supply of coal to the boiler, furnace, or the like, with consequent interruptions in the use of the boiler and the like.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Fig. 1 is an elevation of one form of pulverizing mill provided with a feeding apparatus embodying this invention;

Fig. 2, an enlarged view in elevation and section of a portion of the pulverizing mill, the hopper and the feeding apparatus between the same;

Fig. 3, a longitudinal section of the feeding apparatus shown in Fig. 2, and

Fig. 4, a longitudinal section of the bucket member shown in Fig. 3 removed from the axial closure member.

Referring to Fig. 1, 10 represents a pulverizing mill of known construction, provided with an electric motor 12 for operating the operative parts, not shown, which are employed for pulverizing the coal fed to it from a hopper 13 which is connected with a suitable source of supply.

The pulverizing mill 10 is provided with an inlet mouth or port 14 (see Fig. 2) into which the coal from the hopper 13 is fed by a feeding apparatus embodying this invention.

The feeding apparatus herein shown comprises a bucket member having a plurality of axially extended buckets 15 annularly arranged and provided with side walls 16, each pair of which forms a bucket which is normally open at its outer and inner ends, the latter being substantially closed by an axially arranged closure member 20, which may be a solid shaft or as is preferred which may be made hollow as herein shown, and about which the bucket member is designed to be revolved.

In the present instance, the side walls 16 are attached at their ends to headers 22, 23, the header 22 having an opening 24 (see Fig. 4) to permit the bucket member to be slipped

onto the axial closure member 20, and the header 23 is provided on its inner surface with a central circular recess 25 into which is extended the free end of the axial closure member 20.

The header 23 is provided on its outer surface with a hub 26, which is keyed or otherwise fastened to a shaft 27 having bearings in a supporting member 28 secured to or forming part of a side wall 29 of a casing 30 in which the bucket member is located.

The casing 30 is attached to the mill 10 and is provided with an outlet mouth 31 which registers with the inlet port or mouth 14 of said mill.

The axially arranged closure member 20 is supported by the side wall 32 of the casing 30, and when made as herein shown communicates with a pipe 33 which is connected with a source of supply of air or other fluid under pressure.

The feeding apparatus is located in the casing 30 so that the rotatable bucket member is revolved in close proximity to the wall 34 of the casing, which is preferably provided with a curved lower end portion 35 of substantially the same radius as that of the rotatable bucket member, so as to prevent the coal passing into the mill 10 between the bucket member and the wall 34.

The curved end portion 35 of the wall 34 is preferably provided with a removable liner 36.

The casing 30 is provided above the bucket member with a wall or partition 37, which is pivoted at its upper edge and has its lower edge in proximity to the bucket member, and said wall serves as a movable wall for the outlet mouth of the hopper to prevent coal passing freely to the mill above the bucket member, yet is movable to permit solid pieces to pass under it and thereby prevent injury to the feeding apparatus.

The partition or wall 37 is arranged at one side of a vertical plane passing through the axial center of the bucket member, so that as the bucket member is revolved counter-clockwise in the direction indicated by the arrow 40, a plurality of buckets are presented to the outlet mouth of the hopper to be filled with coal by gravity through their outer mouths, and the filled buckets are then carried beyond the movable wall 37 to the other side of the vertical plane through the axis of the rotatable bucket member.

When the filled buckets have passed beyond the movable wall 37, their outer mouths approach the inlet port 14 for the mill and are presented to said inlet port so that the coal in each bucket is discharged by gravity through the outer mouth of the bucket into the mill through the inlet mouth 14 thereof.

It will be observed that the load in each bucket is moved about the axial closure member 20, which prevents the coal in the bucket

sticking to the closure member 20 and assists gravity in discharging the load. Gravity may be still further assisted in discharging the load by projecting jets of air or other fluid through one or more rows of ports 42 extended longitudinally of the closure member 20 when the latter is made hollow as herein shown, said air outlet ports being arranged to co-operate with each bucket when the latter is in its discharging position with its outer mouth presented to the inlet port 14 of the mill as represented in Fig. 2. The air jets not only assist gravity in discharging the load from the buckets, but also serve to scour the side walls of the bucket and prevent moist coal from sticking thereto, thereby maintaining the bucket in condition to receive and discharge a maximum load and to that extent ensuring maximum efficiency of the feeding apparatus.

Provision is also made for preventing coal containing moisture from accumulating on the lower wall 43 of the inlet port 14 for the mill, and to this end said lower wall is formed as a part of a casing 45 which constitutes an auxiliary air chamber which is connected by a passage 46 with the air supply pipe 33 and is provided with outlet ports 47 made in the wall 43. The air outlet ports 47 are inclined downward toward the inlet port 14 of the mill and the air issuing therefrom has a scouring action on the inclined wall 43 and prevents moist coal accumulating thereon and in time building up so as to form a wall of coal which would more or less close the inlet port 14 of the mill and in time stop the supply of coal to the boiler or furnace and necessitate shutting down of the boiler or furnace until the inlet port 14 of the mill was cleared of the obstruction.

The rotatable bucket member 10 may be driven in any suitable manner, as for instance, by an electric motor 50, which is connected in a manner well understood and by mechanism represented by the belts 51, 52 shown in Fig. 1.

The pulverizing mill 10 herein represented is of known construction and is not herein described in detail as it is believed such description to be unnecessary for a proper understanding of the present invention, which is not limited to the use of any particular construction of pulverizing mill.

A preferred construction of feeding apparatus embodying the invention is herein shown, but it is not desired to limit the invention to the particular construction shown.

What is claimed is:

1. In a feeding apparatus of the character described, in combination, a rotatable bucket member provided with axially extended walls spaced a substantial distance apart at both their inner and outer ends to form a plurality of buckets open at their inner and outer ends continuously throughout the length

thereof, a closure member cooperating with the inner ends of said buckets to substantially close the same and about which the bucket member is revolved, said closure member being constructed and arranged to maintain said buckets substantially closed at their inner ends from a position in which they are loaded by gravity through their open outer ends into a position wherein they are unloaded by gravity through said open outer ends, said walls co-operating with said closure member to effect bodily movement of the material in the buckets with relation to said closure member while said material is being discharged by gravity from said buckets.

2. In a feeding apparatus of the character described, in combination, a rotatable bucket member provided with axially extended walls spaced a substantial distance apart at both their inner and outer ends to form a plurality of buckets open at their inner and outer ends continuously throughout the length thereof, a hollow closure member co-operating with the inner ends of said buckets to substantially close the same and about which said bucket member is revolved, said hollow closure member being constructed and arranged to maintain said buckets substantially closed at their inner ends from a position in which they are loaded by gravity through their open outer ends into a position wherein they are unloaded by gravity through said open outer ends, and having a fluid inlet and a fluid outlet, the latter being arranged to communicate with the inner ends of the buckets through the open inner ends thereof to assist gravity in unloading the buckets when the latter are in their discharging position.

3. In a feeding apparatus of the character described, in combination, a rotatable bucket member having headers spaced apart and a plurality of axially arranged walls supported by said headers and forming therewith a plurality of axially extended buckets open and of substantial width at their outer and inner ends continuously throughout the length thereof, a hollow closure member about which said bucket member revolves, said hollow closure member being provided with a fluid inlet and with a fluid outlet, said fluid outlet co-operating with the inner open ends of the buckets when the latter are substantially in their discharging position, an auxiliary fluid chamber having a fluid inlet and provided with a fluid outlet arranged to project fluid into the material after the latter has been discharged from said buckets.

4. The combination with a pulverizing mill having an inlet port for coal to be pulverized, said inlet port having a perforated inclined wall, of a hopper for supplying coal to said mill, and a feeding apparatus for said coal located between said hopper and said mill and having a rotatable bucket member provided with a plurality of buckets open

and of substantial width at their outer and inner ends continuously throughout the length thereof, and a stationary hollow closure member for said inner open ends of said buckets about which the bucket member is revolved to effect bodily movement of the coal in said buckets circumferentially of said stationary closure member and carry the load in said buckets to the inlet port of said mill and discharge said load into said inlet port adjacent the perforated inclined wall thereof, said stationary closure member having a fluid inlet and a fluid outlet, the latter being located adjacent to the perforated inclined wall of the inlet port for said mill, and means for supplying air under pressure to said stationary closure member and against said perforated wall.

5. In a feeding apparatus of the character described, in combination, a rotatable bucket member provided with axially extended walls forming a plurality of buckets open at their outer and inner ends, a closure member co-operating with the inner ends of said buckets to substantially close the same and about which the bucket member is revolved, said walls forming openings at the inner end of the buckets of substantial width and length to afford a relatively large area of contact between material in the bucket and the closure member, whereby upon revolution of the bucket substantial movement is imparted to the material thereby preventing its adherence to the closure member and to the lower portion of the walls of the bucket.

In testimony whereof, I have signed my name to this specification.

CYRUS CORLISS.