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FUEL CONVEYING AND CRUSHING MECHANISM FOR LOCOMOTIVE STOKERS,
APPLICATION FILED FEB. 24, 1919. RENEWED NOV. 22, 1920.

1,404,985.

Patented Jan. 31, 1922.

2 SHEETS—SHEET 1.

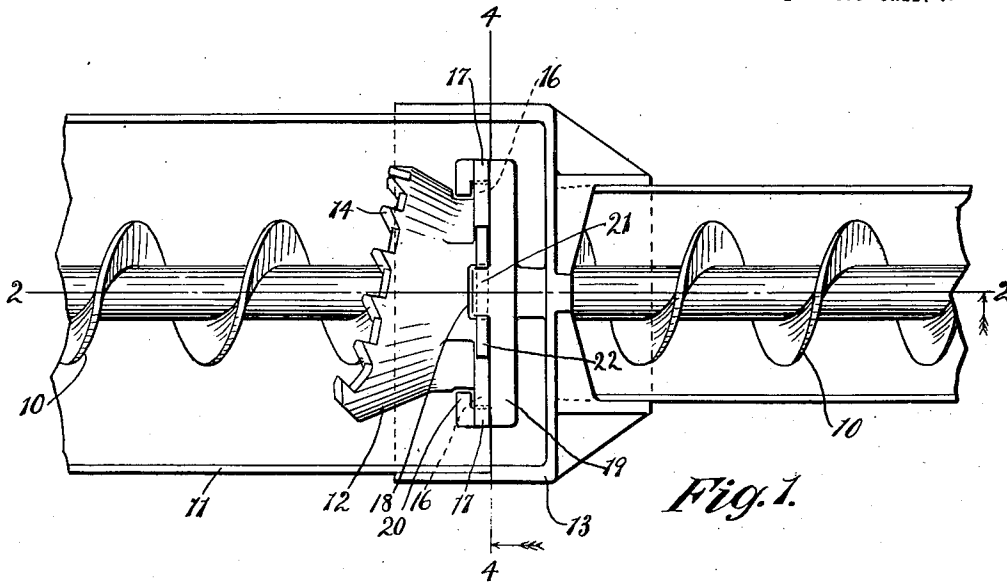


Fig. 1.

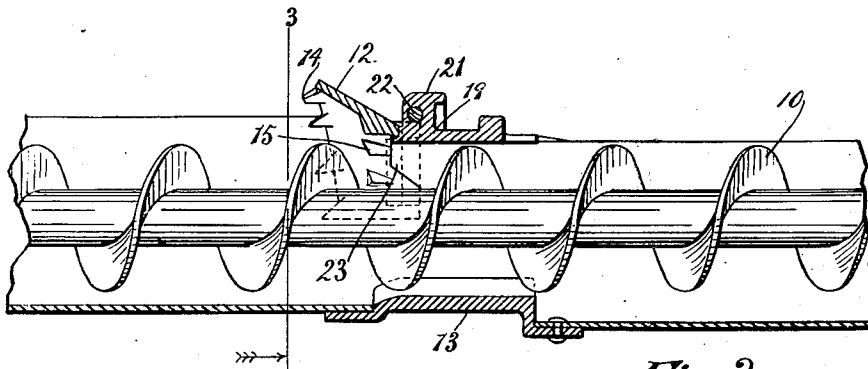


Fig. 2.

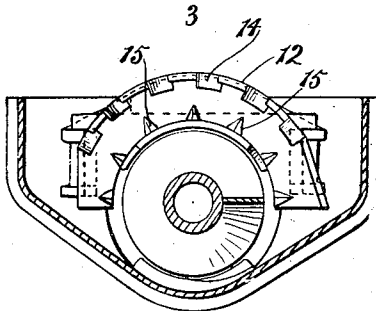


Fig. 3.

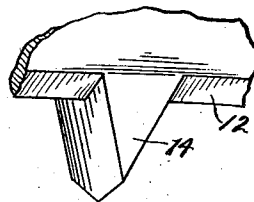


Fig. 4.

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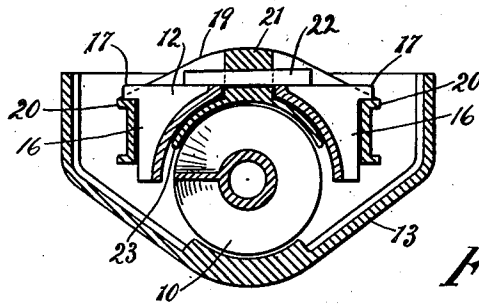


Fig. 4.

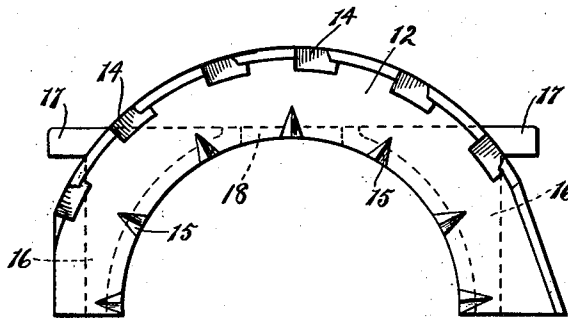


Fig. 5.

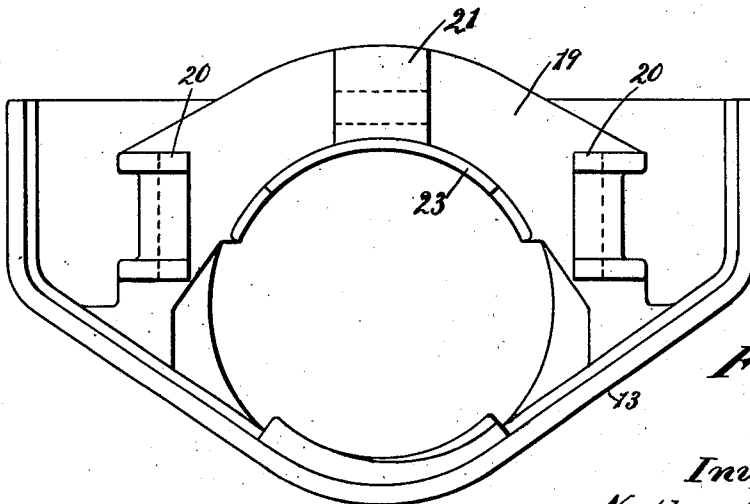


Fig. 6.

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UNITED STATES PATENT OFFICE.

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FUEL CONVEYING AND CRUSHING MECHANISM FOR LOCOMOTIVE STOKERS.

1,404,985.

Specification of Letters Patent.

Patented Jan. 31, 1922.

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To all whom it may concern:

Be it known that I, NATHAN M. LOWER, a citizen of the United States, and resident of Pittsburgh, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Fuel Conveying and Crushing Mechanism for Locomotive Stokers, of which the following is a specification, and which is illustrated in the accompanying drawings, forming a part thereof.

The invention relates to locomotive stokers in which the fuel is transferred by means of a spiral conveyor and reduced in size by the action of the conveyor and a crushing jaw.

In order that fuel may be used without previous preparation or selection it is necessary to provide, in conjunction with stoking mechanism, means for reducing the larger lumps, and it has been found in practice that where a mere abutment is employed against which the fuel is forced by the conveyor the crushing operation not only requires enormous expenditure of power but the use of an excessively heavy conveyor vane.

It is also found that under any circumstances the mechanism frequently becomes clogged, especially by extraneous matter, such as pieces of metal which may be accidentally mixed with the fuel. The removal of such obstructions has been difficult and time consuming, often interrupting the action of the stoker for a longer period than is tolerable in railroad practice.

The objects of this invention are to provide, in conjunction with a spiral conveyor, a jaw so configured and disposed with reference thereto that the most obstinate fuel lumps are readily and easily reduced, and the jaw, while being securely held in position for service, may be readily removed to permit the extraction of clogging material.

The invention consists in a structure such as is hereinafter described and as illustrated in the accompanying drawings, in which—

Fig. 1 is a detail plan view of the conveying and crushing mechanism;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a face elevation of the crushing jaw;

Fig. 6 is a face elevation of the frame for holding the jaw and which constitutes a section of the conveyor trough; and

Fig. 7 is a detail of a modification of certain spurs on the crushing jaw.

The conveyor screw 10 is mounted within a trough or conduit, the rearward end 11 of which is adapted to receive the fuel, as through an aperture in the floor of a locomotive tender. At the forward end of and arching over the trough section 11 there is mounted a crushing jaw 12, which is supported within a frame 13 forming a section of the conveying conduit. The jaw 12 presents a flaring face to the advancing fuel, and is substantially in the form of a half section of a cone, having its margin cut on a plane oblique to the axis of and being approximately of the same pitch as the screw vane, and being so directed as to parallel the portion of the vane which is uppermost. By this arrangement the crushing stresses are transmitted in lines approximately perpendicular to the face of the vane of the conveyor and to the edge of the jaw.

The jaw is provided with spurs or teeth which, as shown, are formed both upon its edge and on its inner face. An outer set 14 of spurs is formed along the edge of the jaw and so configured as to present an apex to the material urged against them by the conveyor vane. The face margin of each of these spurs, that is to say, the margin which is directed backwardly with reference to the direction of rotation of the screw, is substantially parallel with the axis of the jaw, and therefore serves as an abutment for holding the material against lateral movement and effecting its immediate reduction by a crushing and cutting action. The edge of the jaw is preferably brought to an edge, as shown. The face margin of the marginal spurs may also be brought to an edge, as shown in Fig. 7, thereby effecting the reduction of the material with an expenditure of somewhat less power.

It is found in practice that such material as coal, when advanced by a screw, is car-

ried around with the screw to some extent, making, in some instances, one complete turn in six revolutions of the screw. This movement depends on the relative coefficients of friction of the screw vane and the walls of the trough or conduit. When a positive obstruction to the advance of the fuel is encountered, such as the crushing jaw, the fuel will be carried around with the screw, sliding along the edge of the jaw. This turning movement is in part resisted by giving the margin of the jaw an oblique direction, the resistance increasing to some extent as the degree of obliquity is increased. This checking of the advance of the fuel reacts upon the fuel farther back and causes it to "boil" up in the trough. This lateral or turning movement of lumps upon the jaw edge has the further disadvantage that the reduction is finally accomplished at the bottom of the trough, causing a congestion at that point.

This turning movement along the margin of the jaw is increasingly objectionable when extraneous material, such as pieces of iron, is present in the coal. Such material results in clogging the apparatus and must be removed. If the clogging matter can be arrested at the top of the trough it is easily removed, but if carried to the bottom of the trough its removal involves considerable labor and may interrupt the stoking operation for so long a time as to cause a lowering of boiler pressure. It is of great importance, therefore, that the reduction of the fuel be expeditiously accomplished without materially checking the advance movement, and that so far as practicable it shall occur at the upper portion of the mass. These results are secured in the present instance by the oblique direction of the margin of the jaw, by the comparatively sharp edge given it, and by the spurs, each contributing to the accomplishment of the desired purpose, and, acting conjointly, being increasingly effective. The advance of the screw vane upon an arrested lump of coal is in the nature of a wedge action, the pressure building up gradually and hence with augmented force.

The second set, 15, of spurs is, as shown formed on the inner surface of the jaw, extending to its throat, and grip lumps of fuel which enter under the jaw but which are too large to pass through its throat, holding them while the screw vane effects their reduction.

Integral with the jaw and at its smaller end there is formed a laterally extended body 16 having at each upper corner a laterally projecting lug 17. Midway of its ends the body portion is vertically recessed, as indicated at 18.

The frame 13 is provided with a chair 19 for receiving the body portion 16 of the

jaw, this chair comprising a plate transverse to the axis of the conveyor conduit and having its ends turned backwardly and inwardly, substantially to hook form, as shown at 20, thereby providing ways for receiving the leg portions of the body 16 and seats upon which the lugs 17, rest. Midway of its ends the chair 14 is provided with a backwardly projecting boss 21, which enters the recess 18 when the jaw is in position. This boss is pierced to receive a key 22 for locking the jaw within the chair by resting on top of the body 16. The plate 19 is so configured as to arch over the conveyor screw, and at its lower margin may be provided with a flange 23 upon which the crushing jaw may rest. The tendency of the jaw to tilt upwardly is resisted by the hook portions 20 of the chair.

I claim as my invention—

1. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face and its edge being oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.

2. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face and its edge being provided with spurs and following a line oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.

3. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face provided with a series of spurs and its edge following a line oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.

4. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face provided with a series of spurs and its edge being provided with spurs and following a line oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.

5. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face and having a knife edge oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.

6. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face and having a knife edge provided with spurs and following a line oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.
7. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, and a crushing jaw secured in the conduit, such jaw presenting to the advancing fuel a flaring face and its edge being provided with spurs each presenting a cutting edge backwardly with reference to the direction of rotation of the conveyor and following a line oblique to the axis of the conveyor and pitched in the same direction as the vane thereof.
8. In a fuel conveying and crushing device for locomotives, in combination, a conduit, a spiral conveyor in the conduit, a crushing jaw arching over the conveyor, a curved cutting edge on said jaw presented to material advanced by the conveyor and spurs located upon and breaking the continuity of said cutting edge.
9. In a fuel conveying and crushing device for locomotives, in combination, a conduit, a spiral conveyor in the conduit, a crushing jaw arching over the conveyor and having abutments provided with cutting edges opposing rotative movement of the material, and means to prevent relative movement between the crushing jaw and the conveyor.
10. In a fuel conveying and crushing device for locomotives, in combination, a conduit, a spiral conveyor in the conduit, a crushing jaw arching over the conveyor and disposed diagonally to the axis of the conveyor and in the general direction of the pitch of the vane thereof.
11. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, one section thereof comprising a frame having a chair for removably holding a fuel crushing jaw, a spiral conveyor within the conduit, a crushing jaw seated in the chair, and releasable means for securing the jaw.
12. In a fuel conveying and crushing device for locomotive stokers, in combination, a conduit, a spiral conveyor in the conduit, a jaw supporting chair in the conduit and having vertical ways, a crusher jaw arching over the conveyor and having lateral extensions seated in the ways.
13. In a fuel conveying and crushing device, in combination, a conduit, means for advancing fuel therethrough, and a crushing member immovably associated with the conduit and having teeth projecting backwardly with reference to the direction of advance of the fuel and disposed at different distances from the axis of the conduit, the outer teeth projecting backwardly a greater distance than the inner teeth.
14. In a fuel conveying and crushing device, in combination, a conduit, means for advancing fuel through the conduit, a crushing member immovably associated with the conduit and being provided with spurs projecting generally backward with reference to the direction of advance of the fuel, the outer teeth having their apexes in advance of the inner teeth.
15. In a fuel conveying and crushing device, in combination, a conduit, means for advancing fuel therethrough, a crushing member immovably associated with the conduit and being inclined backwardly with reference to the direction of advance of the fuel and having spurs on its backwardly facing surface.
16. In a fuel conveying and crushing device, in combination, a conduit, means for advancing fuel therethrough, a crushing member immovably associated with the conduit and being inclined backwardly with reference to the direction of advance of the fuel and having its backwardly facing surface roughened.

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