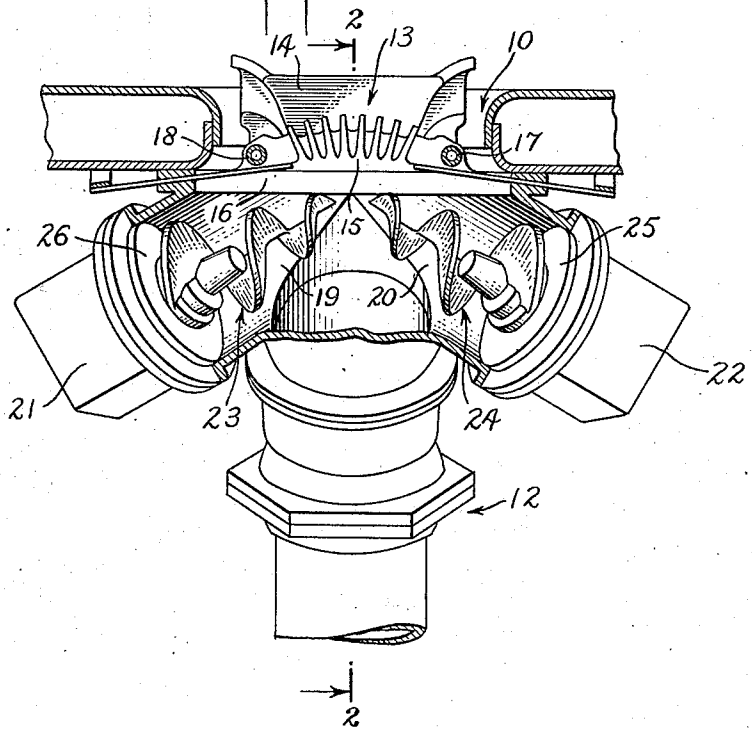
Dec. 3, 1940. W. T. HANNA 2,223,988

STOKER MECHANISM

Original Filed May 23, 1934 2 Sheets-Sheet 1

Fig. 1.



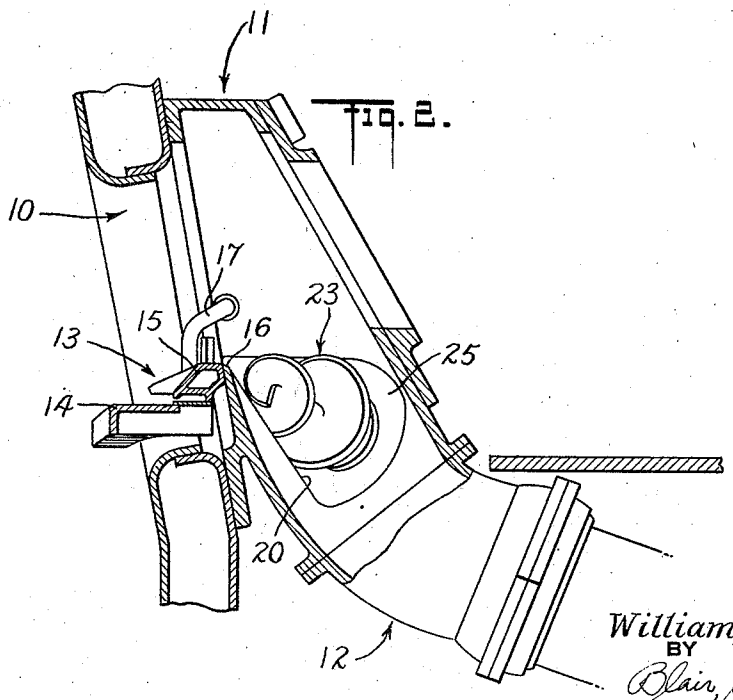


Fig. 2.

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Fig. 3.

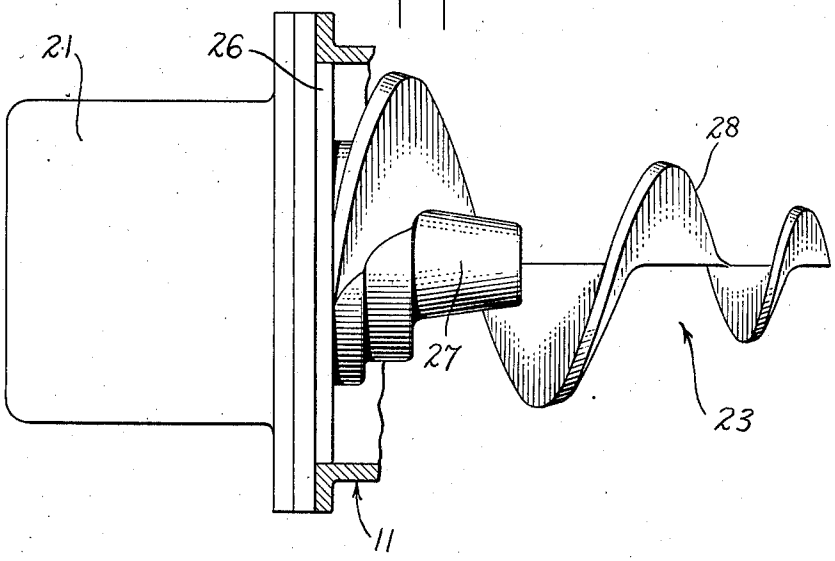
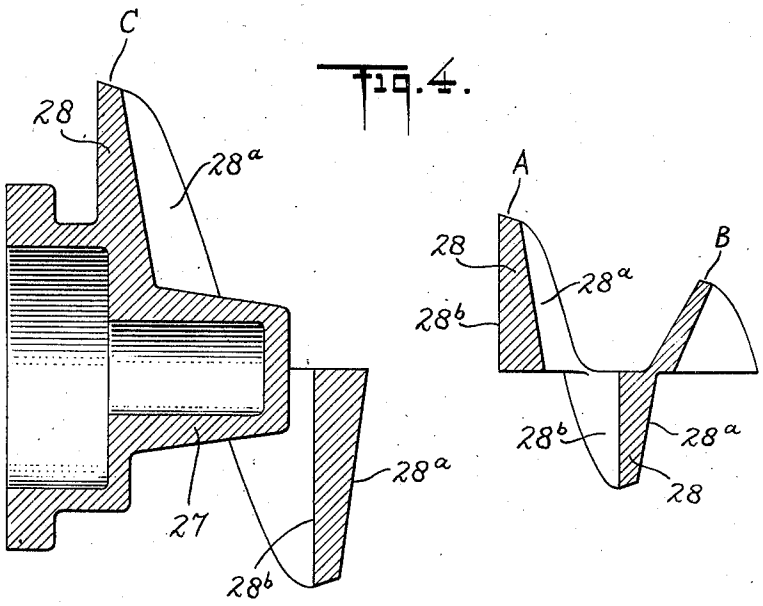


Fig. 4.



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UNITED STATES PATENT OFFICE

2,223,988

STOKER MECHANISM

William Thompson Hanna, Cincinnati, Ohio

Application May 23, 1934, Serial No. 727,096
Renewed July 29, 1939

8 Claims. (Cl. 110—105.5)

This invention relates to fuel conditioning apparatus and more particularly to the specific structure of worms suitable for use with such apparatus.

One of the objects of this invention is to provide fuel conditioning apparatus which may be economically manufactured with an appreciable saving in labor and materials. Another object is to provide apparatus of the above character which will be simple, practical and thoroughly durable. Another object is to provide apparatus of the above character which will be efficient and reliable in operation. Another object is to provide apparatus of the above character which will disintegrate and loosen a conglomerate mass of fuel or the like without seriously impeding the progress of that fuel toward the fire box. Another object is to provide apparatus of the above character which may be easily installed and which may successfully replace certain parts of stoking apparatus now in common use. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of my invention:

Figure 1 is a top plan view of my apparatus as installed and ready for use, certain of the parts thereof being broken away;

Figure 2 is a vertical sectional view of the apparatus shown in Figure 1 and taken substantially along the line 2—2 of Figure 1;

Figure 3 is a side elevational view of one of the worms shown in Figure 1 on an enlarged scale, and

Figure 4 is a sectional view taken through the axis of one of the worms shown in Figure 1.

Similar reference characters refer to similar parts throughout the several views of the drawings.

As conductive to a clearer understanding of certain features of this invention, several of the difficulties met with in the efficient conditioning of fuel for burning and distribution before entering the fire box will be mentioned. The fuel used by most locomotives or the like is generally known as "run of the mine" coal comprising a heterogeneous mass of particles of various sizes. Stoking apparatus now in use has for one of its functions the crushing and breaking of the larger particles of coal into smaller particles. However, when this coal becomes wet, as is often the case, it is slightly adhesive by nature and its natural tendency is to stick together in large masses. The passage of the coal through the stoking apparatus often increases this tendency by compressing the mass; thus when delivered at the entrance of the fire box it comprises a series of large clumps unfit for burning or distribution within the box. Various devices are now utilized to disintegrate these large clumps into a loose mass, and it is one of the objects of this invention to provide apparatus which is an improvement in the hereinabove mentioned devices.

Referring now to the drawings in detail, there is shown in Figures 1 and 2, a fire box opening generally indicated at 10 which may be the usual fuel delivery entrance of a fire box on a locomotive or the like. Covering opening 10 and extending outwardly therefrom is a fuel housing generally indicated at 11 supported in this position in any suitable manner and connected to the delivery end of a conduit generally indicated at 12 forming a part of the stoking apparatus.

Situated within opening 10 is a fuel distributor generally indicated at 13 preferably including a distributor plate 14 and a blast device 15. Blast device 15 is preferably supported in this position by extensions 17 and 18 pivotally mounted in the side walls of the housing 11. Preferably the top side of blast device 15 is flush with the spillway or lower edge 16 of fuel housing 11. Thus, speaking generally, the coal entering fuel housing 11 by way of conduit 12 passes over spillway 16 down upon blast device 15 and distributor plate 14 to be distributed to the various parts of the fire bed.

The bottom surface of fuel housing 11 has preferably formed therein a pair of concave conically shaped recesses 19 and 20 (Figure 1) running in substantially diagonal directions and meeting at a point immediately adjacent spillway 16. Recesses 19 and 20 are in turn adjacent the opening of conduit 12 as best shown in Figure 2. Consequently the natural tendency of coal entering from conduit 12 is to drop down into recesses 19 and 20 during its course toward distributing apparatus 13. As more clearly shown in Figure 1, fuel housing 11 supports a pair of gear boxes 21 and 22 upon its opposite sides and in substantial registry with recesses 19 and 20. Gear boxes 21 and 22 may contain any desirable driving mechanism, and a pair of tap-

ered worms generally indicated at 23 and 24, to be more clearly described hereinafter, are connected to the driving parts of this mechanism and journaled in cap plates 25 and 26. Thus the peripheries of the convolutions of worms 23 and 24 are substantially concentric with recesses 19 and 20 and thus the worms are in effect partially countersunk in the bottom of fuel housing 11.

As described above, the coal entering the fuel housing 11 by way of conduit 12 usually comprises a series of large chunks. These chunks are not solid but generally include a plurality of smaller particles of coal compressed into a mass and held in this condition by the slight adhesive qualities of the coal. However, the chunks of fuel in this condition fall upon the rotating worms 23 and 24 and into recesses 19 and 20 and are accordingly churned about and broken into their component parts as they gradually travel toward spillway 16. When worms 23 and 24 are properly constructed and operating in a desirable manner, they serve to recondition the fuel, changing it into a loose mass of individual particles which fall over the spillway upon distributing apparatus 13 to be distributed over various portions of the fire bed.

I have discovered that the particular shape and structure of worms 23 and 24 are of utmost importance in gaining a maximum efficiency from the fuel conditioning apparatus described above. Accordingly, a preferred form of these worms will now be described in detail. Turning now to Figure 3, worm 23 includes a hub portion 27 which, as described above, is connected to the driving part of the mechanism contained in gear box 21. Hub 27 terminates a considerable distance from the end of worm 23 so that the convolutions 28 of the worm extend out in front thereof. Convolutions 28 have a common axis throughout which is the axis of hub 27. However, the elimination of the hub portion throughout the greater part of the length of the worm, increase the depth of each individual convolution for a worm of given circumferential dimensions. Turning back now to Figure 1, it will be seen that more space is provided between the individual convolutions of worm 23 and recess 20. Accordingly, a larger amount of fuel from conduit 12 may pass under the worm as well as over it to be conditioned in the manner hereinbefore described. This absence of the hub increases the conditioning efficiency of the worms materially and allows the stoking apparatus to supply fuel thereto at a greater rate of speed without the hazard of drawing unconditioned chunks of coal upon the distributing apparatus.

Referring now to Figure 4, the front surface 28*a* of the larger convolutions 28 forms an obtuse angle with the axis of the worm and so slopes forwardly. The rear surface 28*b*, on the other hand, is substantially at right angles to the axis of the worm. It will be understood that the angles of these surfaces may be slightly varied in accordance with the particular conditions under which the worm is to operate.

The convolutions constituting the small end of the worm are preferably formed differently from the larger convolutions. In these the front and rear surfaces slope rearwardly so that surface 28*b* now forms an obtuse angle with the axis, and surface 28*a* an acute angle therewith. This particular relation of the front and rear surfaces of the convolutions is found to produce advantageous and successful operation of the worm.

Furthermore the pitch of the convolutions of worm 23 preferably diminishes as the convolutions approach the front end thereof. Thus, as shown in Figure 4, the distance between points A and B is less than the distance between points A and C. Consequently the fuel when passing along the recesses 19 and 20, underneath and to the sides of worms 23 and 24, is gradually compressed and consequently forced to surge in substantially lateral directions from the worm thus to be effectively broken into its individual components before reaching spillway 16.

Accordingly worms 23 and 24 are designed to operate in a reliable and practical manner to effectively condition a large supply of coal as it is fed thereto by conduit 12. Even though the feeding action of the stoker is quite rapid, this conditioning apparatus performs its function in a successful manner so that the coal entering or dropping upon the distributing apparatus is in proper condition for distribution to all parts of the fire bed. It will thus be seen that I have provided a thoroughly practical and efficient apparatus in which the several objects hereinabove mentioned as well as many others are successfully accomplished.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a stoker mechanism, the combination with a fire box having a fuel entrance, of a conduit provided with means for moving fuel from a source of fuel supply to said entrance, the lower forward edge of said conduit providing a ledge over which fuel flows into said entrance, means for distributing fuel fed to said entrance upon and over the fire. and fuel conditioning and regulating means comprising a rotary worm having a single flight interposed between said fuel moving means and said distributing means and recessed in said conduit generally below and to the rear of said ledge and extending transversely of said conduit, for transforming the fuel into form relatively thinner than the bulk of the fuel in the conduit, said worm being tapered, the leading face of said flight sloping forwardly to form an obtuse angle with the axis of said worm, and the following face of said flight being at right angles to the axis of said worm.

2. In a stoker mechanism, the combination with a fire box having a fuel entrance, of a conduit provided with means for moving fuel from a source of fuel supply to said entrance, the lower forward edge of said conduit providing a ledge over which fuel flows into said entrance, means for distributing fuel fed to said entrance upon and over the fire, and fuel conditioning and regulating means comprising a hubless rotary worm having a single flight interposed between said fuel moving means and said distributing means and recessed in said conduit generally below and to the rear of said edge and extending transversely of said conduit, for transforming the fuel into form relatively thinner than the bulk of the fuel in the conduit, said worm being tapered, and the inner edge of the hubless flight lying in a line coincident with the axis of the rotary worm.

3. In a stoker mechanism. the combination with a fire box having a fuel entrance, of a conduit provided with means for moving fuel from a

source of fuel supply to said entrance, the lower forward edge of said conduit providing a ledge over which fuel flows into said entrance, means for distributing fuel fed to said entrance upon and over the fire, and fuel conditioning and regulating means comprising a hubless rotary worm having a single flight interposed between said fuel moving means and said distributing means and recessed in said conduit generally below and to the rear of said ledge and extending transversely of said conduit, for transforming the fuel into form relatively thinner than the bulk of the fuel in the conduit, said worm being tapered, the leading face of said flight sloping forwardly to form an obtuse angle with the axis of the worm, the following face of said flight being at right angles to the axis of said worm, and the inner edge of the hubless flight lying in a line coincident with the axis of the rotary worm.

4. In a locomotive stoker wherein a conduit communicates with a fuel entrance of a locomotive fire box and is provided with means capable of moving fuel from a source of fuel supply through the entrance and has a lower forward edge providing a ledge over which fuel flows from the conduit into the entrance, the combination with said conduit of a tapered fuel-handling screw adapted to be mounted in said conduit generally below and to the rear of said ledge and pointing in the direction of said ledge, said screw having a single flight and the leading fuel-handling surface of said flight sloping forwardly to form an obtuse angle with the axis of the screw, and said screw serving to transform the fuel flowing from the conduit into the entrance into form relatively thinner in bulk than the fuel in the conduit and to regulate the flow of fuel from the conduit to the entrance.

5. In a locomotive stoker wherein a conduit communicates with a fuel entrance of a locomotive fire box and is provided with means capable of moving fuel from a source of fuel supply through the entrance and has a lower forward edge providing a ledge over which fuel flows from the conduit into the entrance, the combination with said conduit of a tapered, hubless fuel-handling screw adapted to be mounted in said conduit generally below and to the rear of said ledge and pointing in the direction of said ledge, said screw having a single flight and the inner edge of the hubless flight lying in a line coincident with the axis of the screw and the leading fuel-handling surface of said flight sloping forwardly to form an obtuse angle with the axis of the screw, and said screw serving to transform the fuel flowing from the conduit into the entrance into form relatively thinner in bulk than the fuel in the conduit and to regulate the flow of fuel from the conduit to the entrance.

6. A locomotive stoker screw comprising, a tapered fuel-handling screw having a single flight tapering toward its fuel delivery end, and the fuel-handling surface of said flight sloping forwardly to form an obtuse angle with the axis of the screw.

7. A locomotive stoker fuel-handling screw comprising, a tapered vane, the radial depth of said vane being greatest at its fuel receiving end and least at its fuel delivery end, and the fuel-handling surface of said vane being sloped radially from its periphery toward its axis in a direction away from the end of the vane having the greatest radial depth.

8. A locomotive stoker screw comprising, a tapered hubless fuel-handling screw having a single flight tapering toward the fuel delivery end thereof and provided with a fuel-handling surface sloping forwardly to form an obtuse angle with the axis of the screw.

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