Aug. 19, 1941. G. N. PERKINS 2,252,814

COAL DRYING APPARATUS

Filed Oct. 25, 1939 2 Sheets-Sheet 1

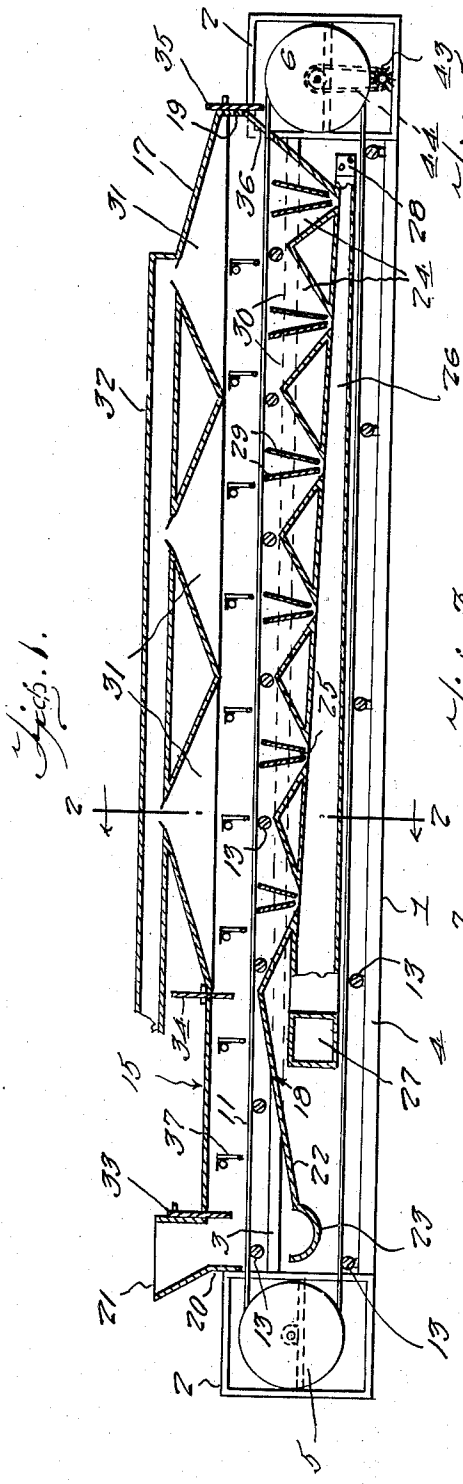


Fig. 1.

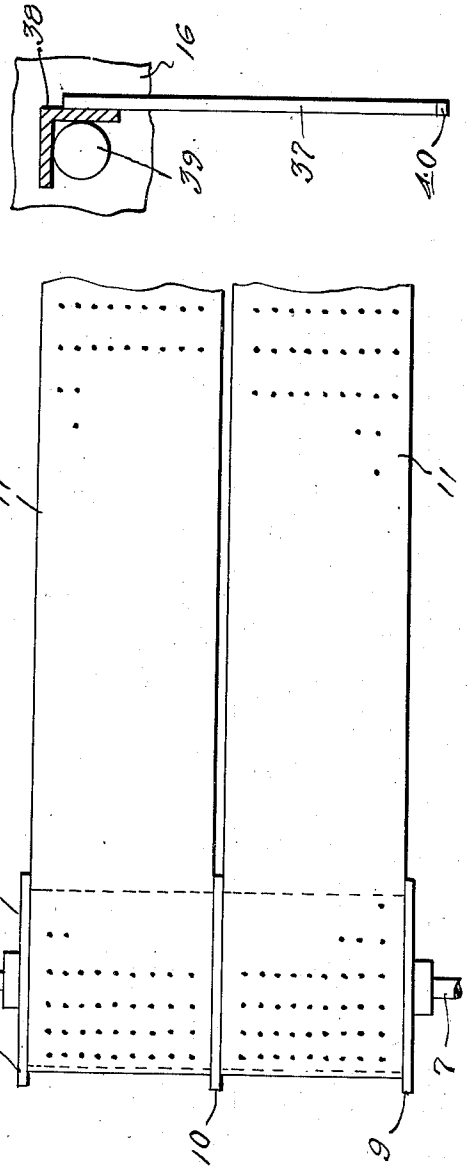


Fig. 3.

Fig. 5.

Inventor

G. N. Perkins

By Clarence A. O'Brien and Hyman Berman

Attorneys

Aug. 19, 1941. G. N. PERKINS 2,252,814

COAL DRYING APPARATUS

Filed Oct. 25, 1939 2 Sheets-Sheet 2

Fig. 2.

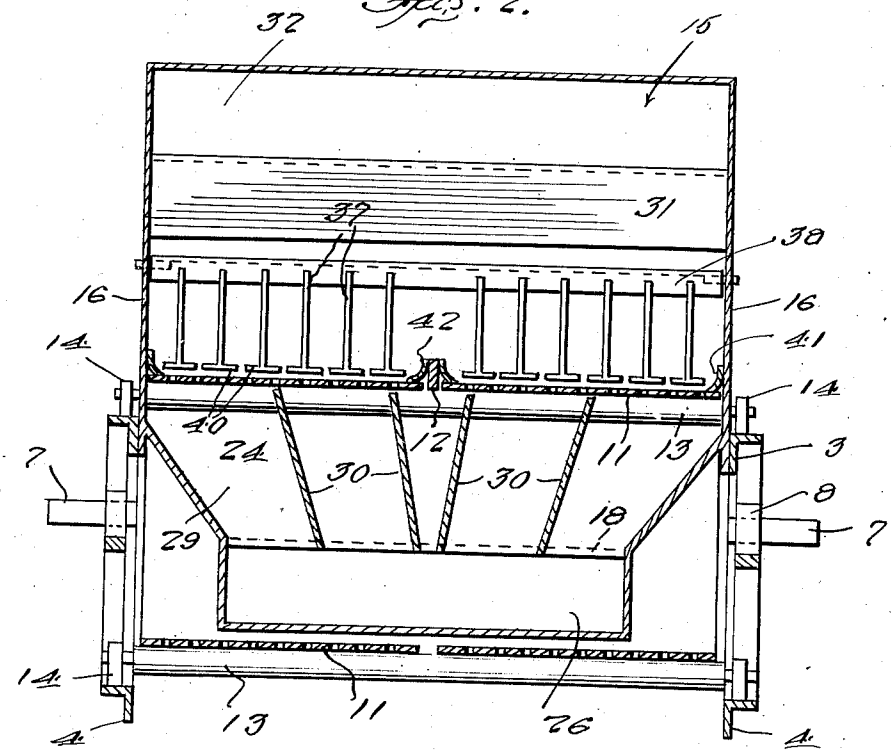
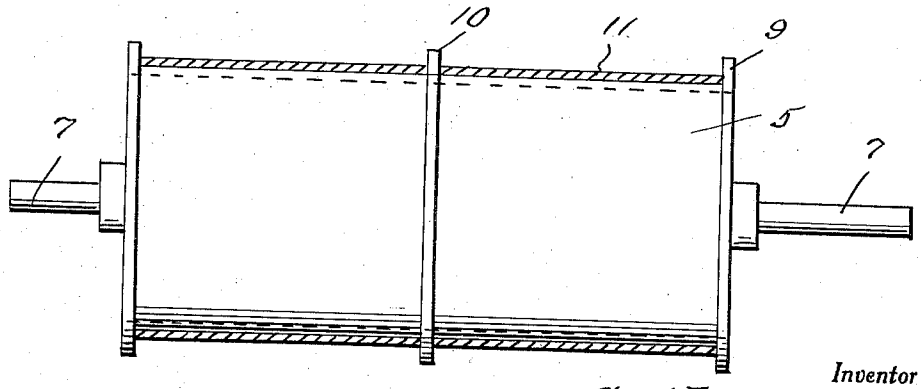


Fig. 4.



Inventor

G. N. Perkins

By Clarence A. O'Brien and Hyman Berman

Attorneys

Patented Aug. 19, 1941 2,252,814

UNITED STATES PATENT OFFICE

2,252,814

COAL DRYING APPARATUS

George N. Perkins, Widen, W. Va.

Application October 25, 1939, Serial No. 301,274

1 Claim. (Cl. 34—232)

My invention relates to improvements in apparatus for drying coal and similar commodities.

The invention is designed with the particular purpose in view of providing an efficient drying apparatus for drying in large quantities small size, or fine, coal evenly and quickly and which is economical as regards manufacture, installation and upkeep.

Other and subordinate objects are also comprehended by my invention, all of which, together with the precise nature of my improvements, will be readily understood when the succeeding description and claim are read with reference to the drawings accompanying and forming part of this specification.

In said drawings:

Figure 1 is a view in longitudinal section of a preferred embodiment of the invention,

Figure 2 is a view in transverse vertical section taken on the line 2—2 of Figure 1 looking in the direction indicated by the arrows and drawn to an enlarged scale,

Figure 3 is a fragmentary view in top plan of the conveyor belt and one of the rollers,

Figure 4 is a view in transverse section taken on the line 4—4 of Figure 3, looking in the direction indicated by the arrows, and

Figure 5 is a view partly in side elevation and partly in section of one of the mixer bars and the mounting therefor.

Referring to the drawings by numerals, the illustrated embodiment of my improved apparatus comprises an elongated frame 1 including end pairs of opposed rectangular bearing frames 2 connected on each side of the apparatus by a pair of upper and lower horizontal bars 3, 4. A pair of front and rear rollers 5, 6 are journaled by stub shafts 7 and bearing blocks 8 in the pairs of frames 2, respectively, to extend horizontally between the frames, said rollers each being provided with radial end flanges 9 and a similar median flange 10. A pair of endless conveyor belts 11 are trained around said rollers 5, 6, side by side, said belts fitting between the median flanges 10 and the end flanges 9. The conveyor belts 11 are of foraminous material and, as will be understood, the upper and lower stretches of said belts are level. A parting bar 12 extends horizontally between the contiguous edges of the upper stretches of said belts 11 with the ends thereof suitably fixed in the apparatus. Transverse idler rollers 13 spaced equidistantly along the upper and lower stretches of the conveyor belts 11 support said stretches intermediate the rollers 5, 6. The idler rollers 13 are journaled at the ends thereof in bearings 14 arising from the bars 3, 4. The upper stretches of the conveyor belts 11 travel through a tunnel-like structure 15 extending between the pairs of bearing frames 2 and rising above said stretches for a suitable distance.

The tunnel structure 15 comprises a pair of side walls 16 suitably secured to and arising from the upper frame bars 3, a top wall 17, a bottom wall 18 intermediate the upper and lower stretches of the conveyor belts 11, a rear end wall 19 and a front end wall 20, the latter together with the side walls 16 and top wall 17 being constructed to form a feed hopper 21 at what constitutes the front end of the apparatus and located above the said belts 11.

The bottom wall 18 is constructed at the front end of the apparatus with a downwardly and forwardly inclined sluice board 22 extending from the under side of the upper stretches of the conveyor belts 11 and terminating at the front end of the bottom wall in a transversely extending trough 23 forming a sump. Intermediate said board 22 and the rear end wall 19 of the tunnel structure 15 the bottom wall 18 and the side walls 16 are constructed and arranged to form a longitudinally spaced series of hopper-like pockets 24 flaring upwardly both longitudinally and laterally beneath the upper stretches of the conveyor belts 11, said pockets 24 increasing in depth, or height, successively towards the rear end of the apparatus. The pockets 24 open at the bottoms thereof, as at 25, into the top of a longitudinally extending conduit 26 forming a hot air manifold and gradually decreasing in size vertically toward the rear end of the apparatus. The front end of the conduit 26 is open, as at 27, for the introduction of hot air under pressure thereinto and the rear end of said conduit is normally closed by a suitable clean-out door 28.

The pockets 24 are divided transversely and longitudinally by laterally spaced, upright, transverse and longitudinal baffle plates 29, 30, inclined from the vertical as best shown in Figures 1 and 2.

Above the pockets 24, the top wall 17 of the tunnel structure 15 is constructed to provide a longitudinally spaced series of dome-like pockets 31 in the top of the structure opening at the tops thereof into a longitudinally extending discharge manifold 32.

Immediately in the rear of the hopper 21 a vertically slidable gate 33 is suitably mounted in the top 17 of the tunnel structure 15. A second similar gate 34 is mounted in said top 17 immedi-

ately in front of the series of pockets 31. A third similar gate 35 is similarly mounted on the rear wall 19 of said structure 15 in the rear of a discharge aperture 36 provided in the rear wall 19 of the tunnel structure 15.

Above the top stretches of the conveyor belts 11 longitudinally spaced series of pendant mixer bars 37 are provided in the tunnel structure 15, the bars in each series being spaced transversely of the tunnel structure and suspended at the upper ends thereof from an angle iron 38 fast on a shaft 39 having its ends suitably journaled in the side walls 16 of the tunnel structure 15, the arrangement being such that each series of mixer bars 37 is swingable lengthwise of the conveyor belts 11 above the same and with the lower ends thereof spaced slightly from said conveyor belts. The lower ends of the mixer bars 37 have cross extensions 40 thereon, past which the coal on the conveyor belts 11 is dragged.

Flexible flashing strips 41 of suitable material are secured in any desired manner to the side walls 16 to overlie the outer edges of the upper stretches of the conveyor belts 11 and form seals between said walls and said edges of the belts. Similar strips 42 are secured to the parting bar 12 to overlie the inner side edges of the upper stretches of the conveyor belts 11 to form seals between said bar and said edges.

The rear roller 6 operates a rotary brush 43 through the medium of a sprocket chain drive 44, said brush being suitably mounted in the rear bearing frames 2 to engage the under face of the lower stretches of the conveyor belts 11 and wipe the same clean and clear of dust and the like.

The manifold 26 is designed to be connected to a suitable source of hot air under pressure, not shown.

Referring now to the operation of the described apparatus. The conveyor belts 11 are set in motion by any suitable power drive, not shown, to one of the rollers 5, 6, so that the upper stretches travel rearwardly. Coal is fed into the hopper 21 and the gate 33 adjusted downwardly so that as coal travels thereunder it is smoothed out to a desired depth. The gates 34, 35 are similarly adjusted to maintain the desired depth of coal on the conveyor belts 11 throughout the same. As the coal is fed through the space between the hopper 21 and the gate 34, moisture therein drains off through the conveyor belts 11 onto the sluice board 22 and down the same into the sump 23. The drained coal then passes through the tunnel structure over the pockets 24. During this phase of operation, the hot air under pressure in the manifold 26 blasts upwardly into the pockets 24 and is uniformly distributed by the shape of said pockets and the baffle plates 29, 30, against the under side of the upper stretches of the conveyor belts 11 to be correspondingly distributed through the belts and against the coal thereon. It will be noted, that the openings 25 in the pockets 24 diminish in size rearwardly of the apparatus, or in other words, in correspondence with the increase in depth of the said pockets 24. Also, as before stated, the manifold 26 decreases in size rearwardly. The result of these features is that the volume of hot air blasted against the coal is greater at the front end of the apparatus where the coal is wettest and gradually diminishes toward the rear in correspondence with gradual drying of the coal on the conveyor belts. The dried coal emerges through the aperture 36 to be fed off the conveyor belts 11 to a suitable storage structure. As the coal passes through the tunnel structure 15, the beater bars 37 drag over and turn the same, as will be clear, thereby facilitating drying thereof. The heated air is pocketed above the coal in the pockets 31 temporarily conserving the same and utilizing its thermal efficiency to a maximum, but, passes out of said pockets 31 into and out of the discharge manifold 32 before it cools to a dew-point whereby moisture is prevented from collecting in the tunnel structure and on the coal.

The foregoing will, it is believed, suffice to impart a clear understanding of my invention without further explanation.

Manifestly the invention, as described, is susceptible of modification without departing from the inventive concept and right is herein reserved to such modifications as fall within the scope of the subjoined claim.

What I claim is:

In a coal drying apparatus, an elongated tunnel having an outlet end, an endless foraminous conveyor having a top stretch extending lengthwise through said tunnel and out of said end, a feed hopper at the opposite end of the tunnel for feeding coal onto said stretch to be conveyed through the tunnel, and an elongated manifold beneath the bottom of the tunnel extending lengthwise thereof and for hot air under pressure, the bottom of the tunnel having therein a longitudinally spaced series of hopper-like pockets opening onto said top stretch and provided with a bottom aperture, respectively, establishing communication between said manifold and pockets whereby hot air from said manifold is discharged into said pockets to expand therein under said top stretch, said manifold tapering rearwardly, and said pockets increasing in size successively in said series from front to rear of the tunnel and said bottom apertures similarly decreasing in size whereby the volume of hot air passing out of said pockets is diminished progressively toward the rear end of the tunnel, and an air outlet manifold for said tunnel.

GEORGE N. PERKINS.