June 28, 1927. 1,633,931

H. A. ELLIS

GRATE BAR FOR FINE FUEL

Filed March 7, 1924 2 Sheets-Sheet 1

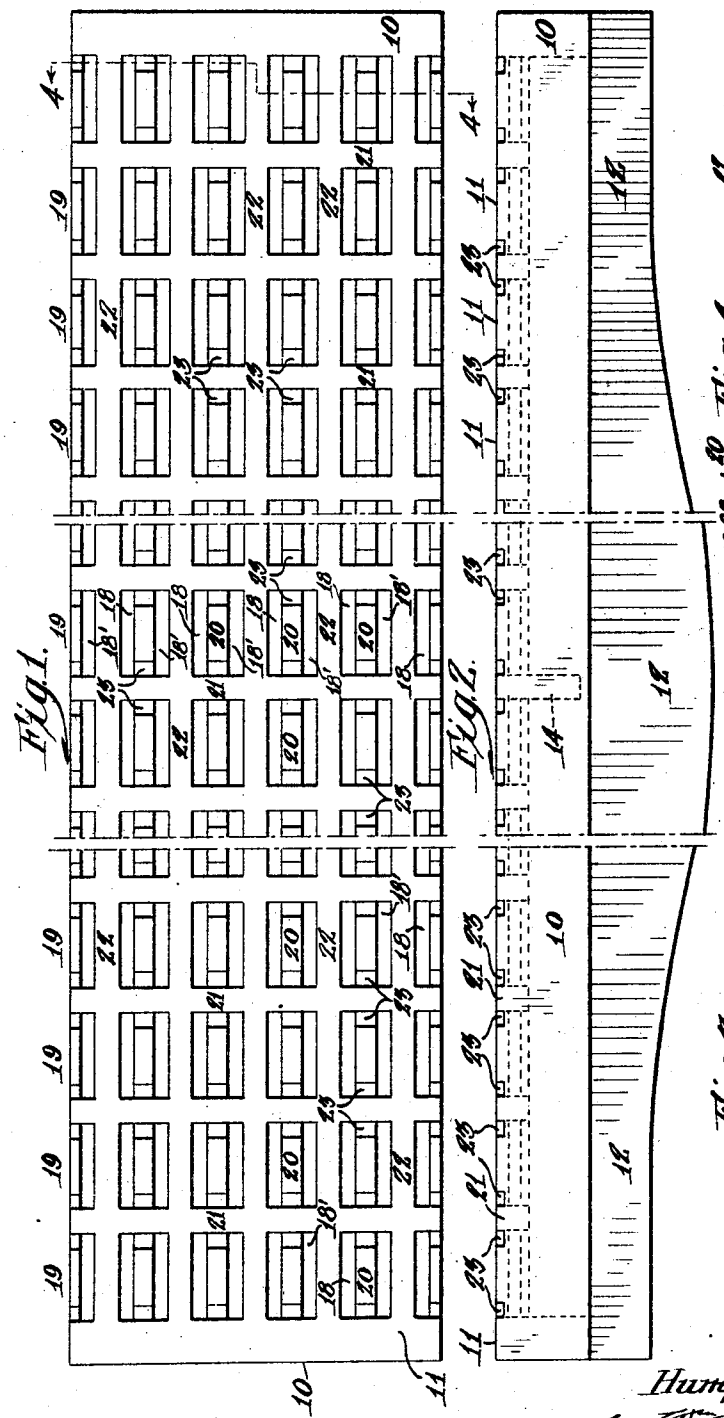


Fig. 1.

Fig. 2.

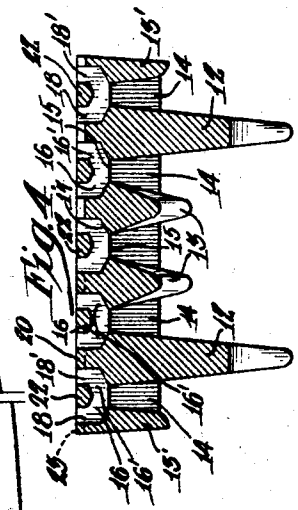


Fig. 4.

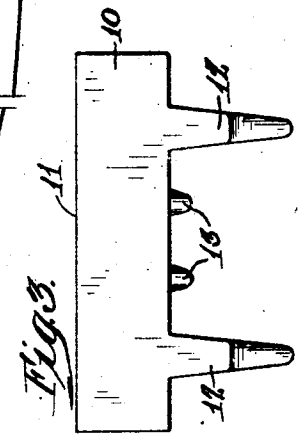


Fig. 3.

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GRATE BAR FOR FINE FUEL

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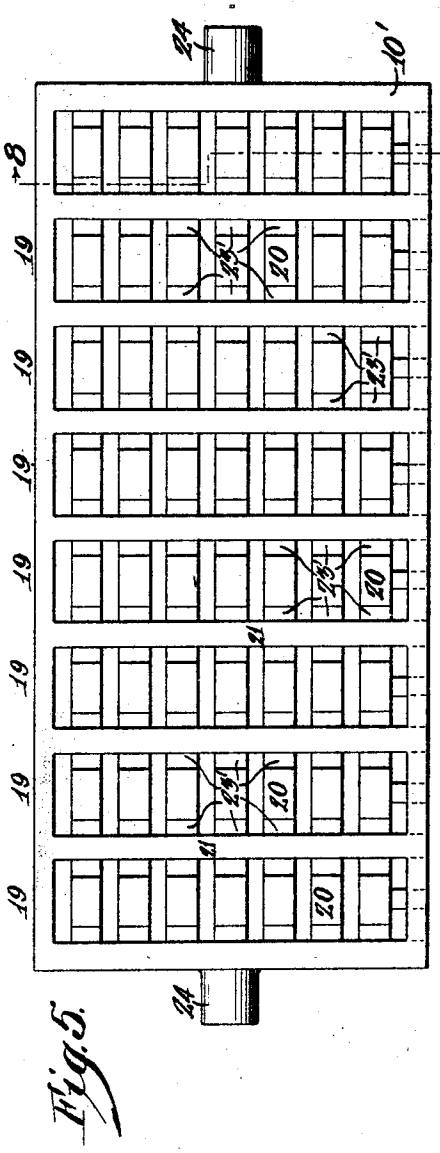


Fig. 5.

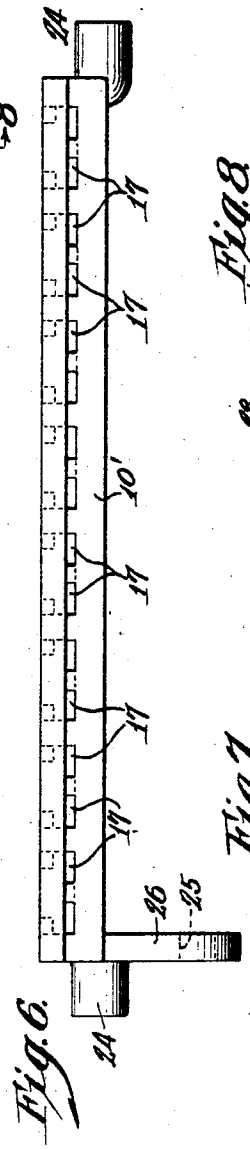


Fig. 6.

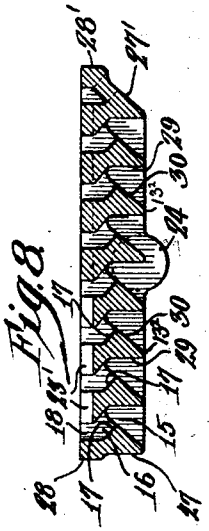


Fig. 8

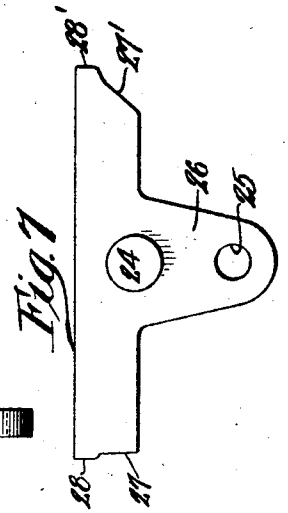


Fig. 7

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UNITED STATES PATENT OFFICE.

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GRATE BAR FOR FINE FUEL.

Application filed March 7, 1924. Serial No. 697,456.

My invention relates to grates intended to burn fine fuel such as the various grades of buckwheat, rice and barley anthracite coals.

The main purpose of my invention is to increase the cross section of air port opening per unit of grate surface, and hence to reduce the resistance of air flow through the grate, and at the same time to prevent the coal from falling through the grate.

A further purpose is to provide air feed openings in the form of slots vertical at their upper sides and offset or transversely directed at their lower sides to prevent passage of fuel.

A further purpose is to provide a feed passage for air with a transverse, preferably diagonal lower surface to permit natural passage of ashes while avoiding passage of fuel.

Further purposes will appear in the specification and in the claims.

I prefer to illustrate my invention by two forms thereof only, selecting forms which are practical, efficient, economical and which at the same time well illustrate the principles of my invention.

Figure 1 is a fragmentary top plan view of one form of my invention.

Figures 2 and 3 are side and end elevations respectively of Figure 1.

Figure 4 is a section of Figure 1 taken upon line 4—4.

Figure 5 is a top plan view of a second form of my invention.

Figures 6 and 7 are side and end elevations respectively of Figure 5.

Figure 8 is a section of Figure 5 taken upon line 8—8.

In the drawings similar numerals indicate like parts.

Describing in illustration and not in limitation and referring to the drawings:—

The grate shown in Figures 1–4 comprises a single integral casting 10, having a top surface 11 and upon its under face being provided with longitudinally extending ribs or truss members 12 with permissibly lighter intermediate strengthening members 13 and 13′.

Whatever the relative strength of the members 12 and 13, equal or otherwise, they provide spaces 14 between them from which slot openings 15 receive their supply of air. Through these openings the air passes in opposite directions into preferably diagonal passages 16, 16′ whose lower walls form shelves 17 upon which ashes rest for a time on their way to the ash pit. These passages 16, 16′ lead into preferably vertical passages 18, 18′ which extend to the upper surface of the grate.

I have shown the openings and passages in rows 19, across the grate but having their greatest dimensions in a longitudinal direction rather than in a transverse direction because of the preferred and natural longitudinal extension of the trusses and strengthening members.

I thus provide in the upper surfaces of the grate bar, a plurality of longitudinally extending spaced openings which may be and ordinarily are large enough for fuel to pass down into them but which are protected from free flow of the fuel, as long as the grate is horizontal or nearly horizontal, by the transverse lower wall 17 between these passages. These air inlets 15 afford outlets for the ashes. The surface of the grate at 20 and 21 at the sides and across the ends of the passages 18, 18′, i. e., between adjoining pairs of passages and at 22 between the passages of the individual pairs affords support for the fuel. The passages taper downwardly to prevent clogging and passage 16 is larger in width than passage 18.

In order to give additional opportunity for air from passages 18, 18′ to permeate the coal bed I provide recesses 23 in the surface of the grate connecting corresponding ends of adjoining passages 18 and 18′ of different pairs, utilizing these recesses effectively as part of the outlet for the respective passages 18, 18′. I prefer to connect passages which are located side by side (i. e., extend recesses 23 transversely) rather than to connect passages adjoining end-to-end, though this makes but little difference.

The supporting bars or ribs may be of the usual longitudinally tapered or beam form, as seen in Figures 2–4 and the ends of the grate may be alike or different according to whether the grate extends entirely across the fire box or part way only. If part way only the ends which adjoin lengthwise should cooperate as far as possible, to present the same character of surface and air feed about the joint as at intermediate parts of the length of each section. As shown, the ends are alike.

In the form shown in Figures 5 to 8, a shaking bar 10′ is shown intended to be pivoted at 24 and to be rocked, by means of

connections well known, engaging within opening 25 of arm 26. Both edges have been relieved, as at 27, 27′, so as to permit shaking movement with respect to the adjoining bar on each side. When back in position the side surfaces 28, 28′ of inside bars rest substantially against side surfaces 28′, 28 of other bars.

In this second form because of the slope which the grate bar surface will have when tilted, each opening 15 communicates with but one passage 16, according to the direction of intended tilting, to avoid the relatively free passage for fuel through the grate which would be offered by the other opening when the bar is tilted. The structure shown tips in a counterclockwise direction with respect to Figures 7 and 8, turning the lower surface 17 of the passage 16 more nearly horizontal with the tilting movement and thus making it, when tilted, safer against passage of the fine coal through the openings than when the grate is in horizontal position.

Recesses 23′ are provided, similar to the recesses 23 in the form of Figures 1 to 4 both in function and in the fact that they connect together at the top passages which have a common inlet opening below.

The strengthening ribs 13^2 are shown as vertical along the edge 29 and as having all of its slope along the edge 30.

It will be evident that the "bent" slots which I provide offer resting places which can be sloped in proportion for the needs of different coals and for different widths of passage so as suitably to retain the ashes, preventing them from sifting through so completely as to allow live coal to pass through. At the same time the ashes can readily be cleared, either by agitation of the grate itself or of the bed close to its upper surface. Because of the "bend" and of the normal presence within the slots of some coal from time to time which has not been completely consumed, the slots do not become completely filled with ashes and there is space for passage of air along the upper side of the U-shaped passage as well as through the body of coal or ashes itself.

Evidently the character of passage formed permits a maximum amount of air opening per unit of grate surface, a special advantage in the burning of fine coal.

It will be obvious that the features of my invention may be used in variant forms and with considerable variety of non-essential detail if it be desired to obtain all or a part of the invention without copying it and it is my purpose therefore to include herein all such variations and changes as come within the reasonable spirit and scope of my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A grate bar having longitudinally extending strengthening ribs on the under surface thereof and diagonal openings sloping upwardly and away from each other from common inlets on the under side of the bar between the ribs and communicating with spaced vertically extending openings to the upper face of the grate.

2. A fixed grate having ribs and longitudinally extending, longitudinally and laterally spaced air inlets between the ribs two passages sloping oppositely from each inlet and vertical passages communicating with the first named passages and opening through the surface of the grate.

3. A fixed grate having longitudinally extending strengthening ribs, longitudinally extending and longitudinally and laterally spaced air inlets between the ribs, two passages extending oppositely from each inlet and vertical passages communicating with the first named passages and opening through the surface of the grate, recesses below the surface of the grate to connect vertical passages communicating with different inlets below the grate.

4. In a grate bar having longitudinally and lateral spaced passages through the upper surface and recesses at the surface to connect adjoining passages of different pairs and having passages communicating with the first passages of the same pair and extending in a direction at an angle with the first passages with common air inlet openings and longitudinally extending strengthening ribs between the air inlet openings.

5. A grate having longitudinally extending strengthening ribs below the surface and U-shaped passages open for air inlet below between the ribs and open for air outlet at the surface of the grate and the said ribs being recessed at the surface to connect the air outlets.

6. A grate having longitudinally extending strengthening ribs below the surface and U-shaped passages open for air inlet below between the ribs and open for air outlet at the surface of the grate and the said ribs being recessed at the surface to connect adjoining outlets of different U-shaped passages.

HUMPHREY A. ELLIS.