

March 20, 1934.

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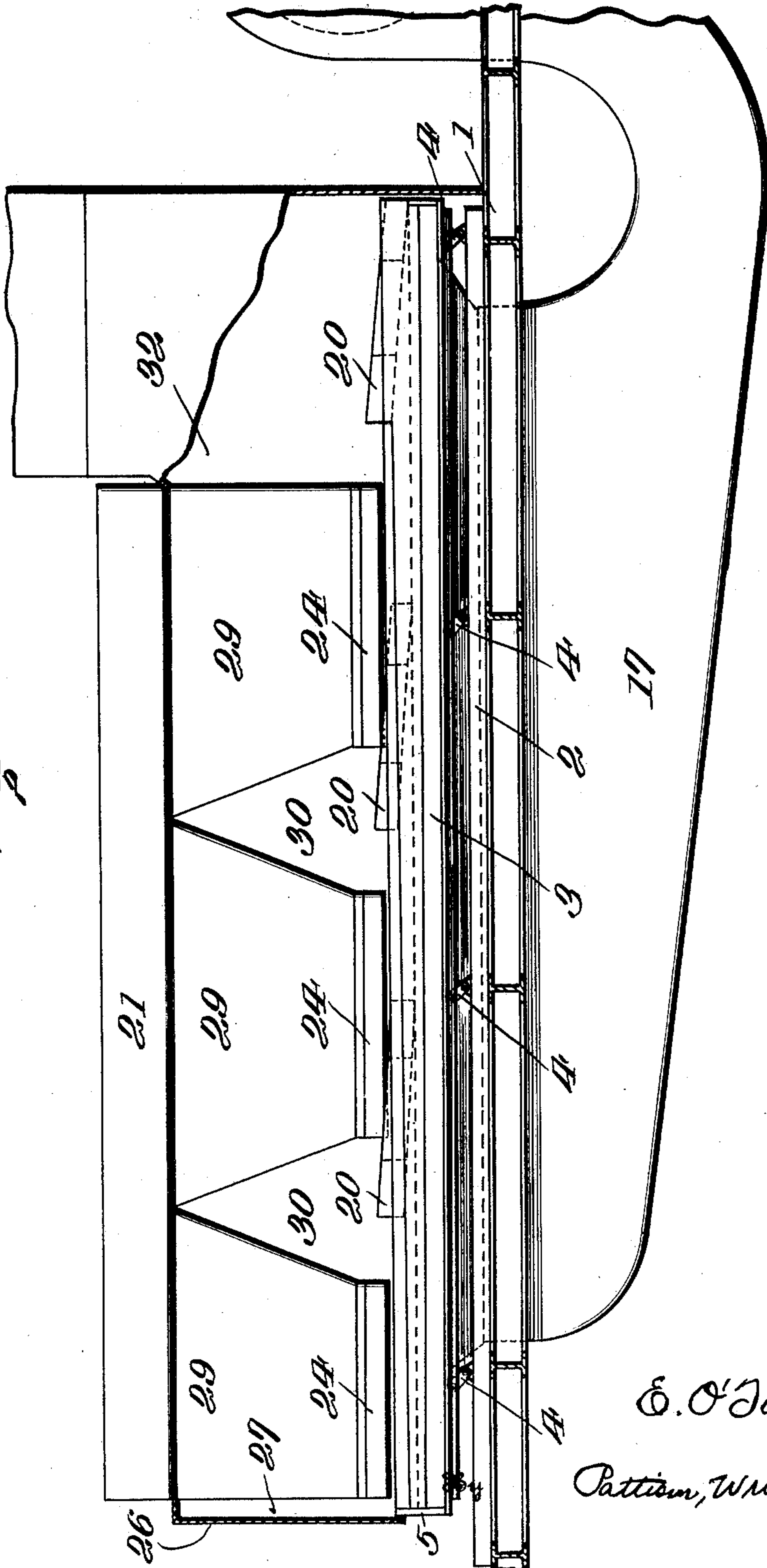
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APPARATUS FOR THE DRY SEPARATION OF COAL AND THE LIKE

Filed March 19, 1931

3 Sheets-Sheet 1

FIG. 1.



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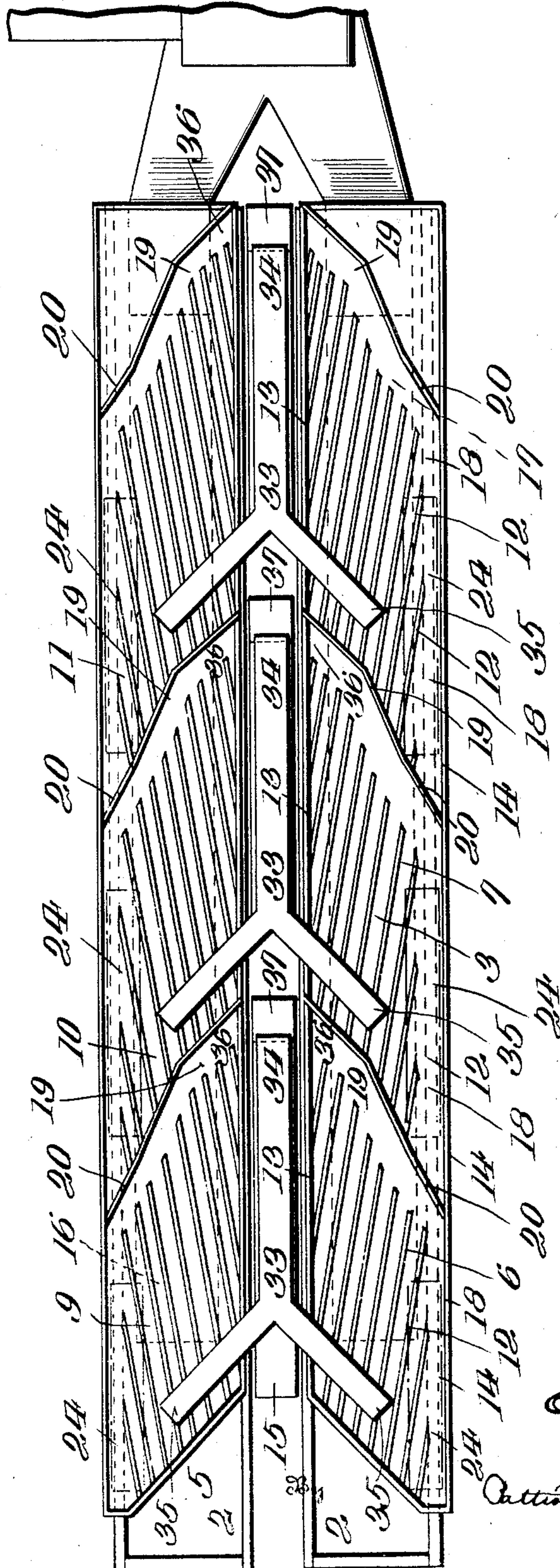
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3 Sheets-Sheet 2

Fig. 2.



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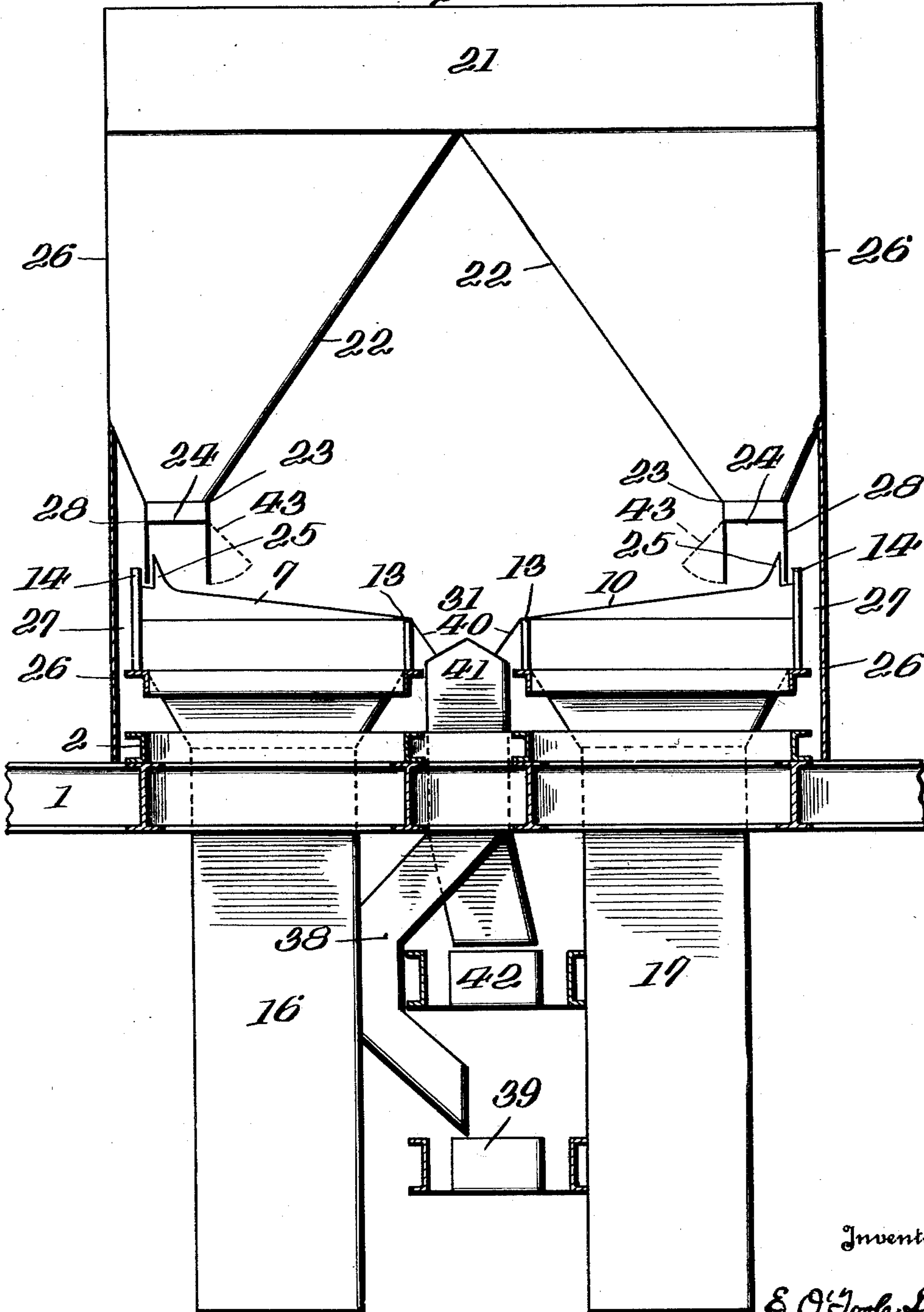
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3 Sheets-Sheet 3

FIG. 3.



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UNITED STATES PATENT OFFICE

1,951,705

APPARATUS FOR THE DRY SEPARATION OF COAL AND THE LIKE

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Application March 19, 1931, Serial No. 523,905

8 Claims. (Cl. 209—467)

This invention relates to improvements in apparatus for the dry separation of coal and the like constructed as hereinafter described.

One object of the present invention is to provide an apparatus for the dry separation of masses of coal and the like which comprises a plurality of connected sections which vibrate longitudinally together, the said sections declined inwardly to a discharge which is located between the inner ends of the several sections.

A further object of the present invention is the production of an apparatus comprising several longitudinally extending connected sections which sections decline from its outer to its inner discharge edge and feeding the coal to be separated in a plurality of longitudinal streams located at the outer high sides of the several sections whereby the coal fed at the outer and high longitudinal portions of the sections is fed to their inner lower edges while the separated slate and refuse of the several sections is fed to the outer edges of the several sections.

Another object of the present invention is to provide an apparatus for the dry separation of coal as above stated and to provide the high outer sides of the deck sections with longitudinally extending aerating and segregating members whereby the separation of the coal is more efficiently accomplished.

In the drawings:

Figure 1 is a side elevation partly in section of an apparatus involving the present improvement.

Fig. 2 is a top plan view of the improved deck with the bin omitted in order to disclose the specific construction of the deck below it.

Fig. 3 is an end view, with the depending sides of the bin and part of the framework shown in cross section.

In the operation of this improved apparatus the coal is fed and is subjected to agitation and to a lifting gaseous cushion whereby the particles composing the mass are stratified and afterwards the several strata of the coal lying above are later fed to a discharge or discharged. This much of the present invention is well understood by those skilled in this art.

Referring now particularly to the drawings I provide a suitable horizontal framework 1 which is preferably composed of metal. Attached in any desired manner to this framework is a longitudinally extending member 2. The deck 3 is supported upon suitable toggles or links 4 of which there are a sufficient number to support said deck. These toggles or links 4 are inclined

towards the feed end 5 of the deck. No attempt is here made to show the specific form of these links further than to have them inclined as stated. This deck 3 is vibrated longitudinally back and forth by means of any suitable mechanism. The mechanism is not shown since any well known desired form for reciprocating the deck 3 may be utilized without departing from the present improvement.

In Figure 2 particularly the deck 3 is composed of several sections 6, 7, 8 located at one side of the apparatus, and sections 9, 10 and 11 which are located at the opposite side of the apparatus. It will be observed that these sections are arranged longitudinal the apparatus. Each one of these sections 6 to 8 are provided with riffles 12 and these riffles are inclined forwardly from the inner edges 13 to approximate their outer edges 14. The sections 9, 10 and 11 located at the opposite side of the apparatus are constructed the same as those above referred to and need not be specifically described. The sides 14 of the several sections extend upward throughout the length of the sections for the purpose of holding the coal on the deck being fed thereto for separation. Preferably the feed end 5 of the sections are inclined forwardly from the outer edges of the sections 6 and 9 to a longitudinally extending centrally arranged discharge opening 15. This is because there would be practically no separation if the feed ends extended straight across the deck and by inclining these ends as stated there is a saving in the amount of air passing upward through the pervious decks and the dead part of the sections 6 and 9 are eliminated.

Located under the sections are air chambers 16 and 17 and one end of these chambers is in communication with a suitable fan, not shown, for feeding the air under the decks thus constituting the air a cushioning medium as it passes upward through the pervious deck. This also is well understood in the art and need not be further explained. It is sufficient to say that this air causes the slate and heavier particles to settle while at the same time the lighter particles of coal are lifted above the heavier particles and above the said riffles of the several sections of the deck.

These deck sections are preferably provided with unobstructed portions 18 adjacent their outer edges. Also these deck sections decline from their outer edges to their inner or discharge edges for a purpose which will be presently described. The discharge ends of these decks are indicated by the numeral 19 which as shown is

unobstructed. That is to say, the riffles stop before they reach the ends of the sections. Each of these unobstructed portions of the sections has what is termed a banking bar 20 that extends forwardly and inwardly from the outer edge of the section to its inner or discharge edge. The function of these banking bars will also be referred to further on.

I provide a longitudinally extending bin 21 into the upper end of which the coal to be separated is fed. This bin has its bottom 22 inclined upwardly forming an inverse V with the outer and lower edges 23 forming the inner wall of outlets 24 for the coal. These outlets 24 are elongated longitudinal the decks and these outlets are shown in dotted lines Figure 2 for the purpose of enabling the present improvement to be understood.

In Figure 3 I show aerating and segregating members 25 which extend longitudinally and upwardly. These members 25 are hollow and air passes through particularly their inner edges from the air chambers located below the sections. Furthermore these members 25 extend longitudinal the deck sections substantially equal to the longitudinal length of the outlets 24.

The said bins 21 have their outer sides 26 extending downward and embrace the whole deck but there are air spaces 27 located between the outer edges of the deck sections and these outer walls of the bins. For the purpose of forming the outlets 24 the lower ends of the bins or bin are contracted inwardly as shown at 28 and their outer walls are located between the sides 14 and the members 25 whereby the members 25 are wholly embraced by these contracted ends and the lower ends of these contracted portions form the said outlets 24 for the coal to be separated.

By reference to Figure 1 it will be seen that the bin 21 communicates with the downwardly extending portions 29 which are contracted and form the crosswise extending inverted V shaped portions 30. These cross V shaped portions 30 have their ends in communication with the spaces 27 and with the longitudinally extending portion 21, the object of which will be presently referred to.

An extension 32 is located at the outlet end of the deck and is in communication with a suitable fan that draws air from the top of the several sections of the deck. Due to the agitation of the coal being separated considerable dust rises from the coal being separated and the bottom of the bin 21 and also the extensions 29 form the top or dust hood for the several sections. This dust laden air is therefore drawn through the spaces 27, 30 thereby drawing with it all of the dust from the interior of this hood and this dust laden air is conveyed away. Preferably the dust laden air is passed through a suitable filter by means of which the dust is collected from the air and then the cleaned air afterward discharged. This is made the subject matter of an application filed by me bearing Serial Number 523,902 filed March 19, 1931 and no claim thereto is made in this application.

Also in Figure 2 I show a device 33 for each section. These devices are essentially Y shaped in plan view. They have their ends 34 located in a plane below the plane of the deck and they are made essentially trough-like in construction. This is specifically described in my pending application.

It is therefore unnecessary to specifically de-

scribe these devices 33. It is sufficient for the purposes of this case to say that the middlings fall from the inner edges of the sections on the members 33 substantially at the point 34 and these middlings are carried rearwardly and upwardly by the members 33 and deposited through the ends 35 of the members 33 onto substantially the feed ends of the several sections.

The object of this is to reclaim from these middlings by subjecting them to a reseparatoring operation thus saving whatever coal may be in the middlings. The slate and refuse of the several sections pass through the open ends 36 and fall through the discharge openings 37 and they follow the chute 38 and are emptied into a refuse trough or receptacle 39 from which the slate and refuse are removed in any suitable manner. The cleaned coal flows from the inner ends 13 of the deck sections onto a suitable guide 40 and thence it falls into a chute 41 and is finally deposited in the clean coal receptacle 42 from which it is suitably removed by means of a mechanical conveyor of any well known suitable type.

The inner side walls of the outlets 24 are formed by suitable doors 43 which swing inward. The function of these doors is to control the amount of coal flowing through the outlets 24 to the deck to be separated. These doors are operated in the manner described in my application Serial Number 523,903 filed March 19, 1931 in which the specific construction of the hinge and means for regulating the doors or gates is shown.

From the foregoing description it will be understood that the outer walls 28 of the openings 24 are substantially rigid while the inner walls of these openings are formed by the adjustable gates or doors 43. It will also be understood that the aerating members 25 extend upward between the doors 43 and the rigid walls 28 of the openings 24.

In operation the coal to be separated is fed in the upper end of the bin 21 and it flows downwardly in the extensions 29 to the passageways 24 from which it flows on to the deck 7. This deck is being vibrated longitudinally and air is flowing upwardly through the pervious deck. The heavy particles of the mass of coal settle to the bottom, that is, the slate and refuse, while the coal is lifted by the air to the top of the mass above the riffles 12. These heavy particles are caught between the riffles and by the reciprocation of the deck they are projected forwardly and outwardly to the unobstructed portion 18 adjacent the outer edges of the sections. The slate thus projected follows these unobstructed portions 18 to the outer end of the unobstructed portion 19 when it flows and is guided by the banking bars 20 to the outlet ends 36 where it falls into the chute 37 and finally finds its way to the receptacle 39. The coal lifted above the riffles flows by gravity to the inner edges of the sections and falls through the passageway 31 into the chute 41 which conveys it to the receptacle 42. During this operation the middlings flow on to the members 33 at about the point 34 and are projected in a direction opposite to the projection of the slate and coal and the middlings is delivered to the open ends 35 substantially at the feed ends of the sections and is reworked whereby the coal remaining in it is reclaimed.

This improvement comprises the several sections that are declined downwardly from their outer edges to the center passageway and the coal is fed to the upper and outer sides of the sections

in separate streams which constitute a side feed in longitudinal streams and a central discharge for the coal, and an outer travel for the slate which finally has a discharge at the center of the apparatus.

Modifications and changes may be made in the invention specifically described without departing from the spirit of the present improvement so long as the change is within a liberal interpretation of the appended claims.

It will be understood that this invention is adapted to separate all kinds of granular material which comprises elements having different weight characteristics.

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

1. An apparatus for the dry cleaning of coal comprising a vibrating deck having a pervious surface, means for feeding coal at opposite edges of said deck, said opposite edges having an elongated passageway, said deck having at each edge an upwardly and longitudinally extending pervious member located in said passageways entering the said coal as it is fed in advance of reaching said deck, for aerating and segregating the same, substantially as specified.

2. An improved apparatus for the separation of coal comprising a pervious deck declined inwardly from its outer edges and having a delivery passageway at its center, said pervious deck having elongated upwardly extending pervious members located at the outer edges of the deck, and a feed for the coal to the deck comprising elongated passageways located at the opposite high edges of the deck and embracing the said pervious members for aerating and segregating the coal, the parts operating as described.

3. An apparatus for the dry separation of coal comprising a pervious deck declined from its outer to its inner edges and having a clean coal discharge located at its center said pervious deck having at its outer upper edges upwardly extending pervious members, a feed passageway embracing the said pervious members, the inner wall of the passageway being adjustable for the purpose described.

4. An apparatus for the dry cleaning of a mass of coal consisting of a deck having a plurality of sections connected and movable together said sections provided with forwardly and outwardly diverging riffles, said sections declined from their outer to their inner edges, the delivery end of one section telescoping the receiving end of the following section, said sections having separated central-elongated outlets for the separated coal and provided with unobstructed portions at their outer edges of said sections for the travel therein of the separated slate, and longitudinally extending feed outlets located substantially over said unobstructed portions whereby the heavy particles of the separated mass are projected forwardly and outwardly while the clean coal flows by gravity inwardly to the said central outlet.

5. An improved apparatus for the dry separa-

tion of a mass of coal comprising a deck made up of a plurality of connected sections each section declined inwardly from its outer to its inner edge, the discharge end of each section tapered forwardly and inwardly, the discharge end of one section overlapping the receiving end of an adjacent section, said sections having a refuse receiving chute at its discharge end and a central elongated passageway for the clean coal located between the refuse chute and the feed end of the section, and means located over said outer edges for feeding said mass of coal to the outer edges of the said sections, for the purpose described.

6. An apparatus for the dry separation of coal comprising a pervious deck consisting of a plurality of connected sections arranged substantially in a line, the delivery end of one section telescoping the receiving end of an adjacent section, said deck declined inwardly from opposite sides thereof, a longitudinal central discharge for the separated coal and a plurality of longitudinally arranged feeding passageways for the coal located at opposite outer edges of each of the deck sections, means for supplying air under said deck and means for longitudinally reciprocating the deck.

7. An apparatus for the dry separation of coal comprising a deck composed of a plurality of operably connected sections arranged substantially in a longitudinal line, the delivery end of one section telescoping the receiving end of an adjacent section, said sections declined from their outer to their inner sides, means for feeding coal to the outer edges of the several sections in longitudinal streams located at the outer edges of each section and extending from the feed end to substantially the telescoping portions of the adjacent sections, each of said sections having outwardly and forwardly extending riffles, and means for reciprocating said sections, whereby the mass of coal is fed in a plurality of separate longitudinally extending streams located at the outer edges of the deck and the clean coal is discharged at the center of the deck, the parts operating as set forth.

8. An apparatus for the dry cleaning of a mass of coal comprising a plurality of deck sections arranged in a line one behind the other, said sections declined inwardly from their opposite edges to their center portions each section provided with unobstructed passageways located at its outer edges, said decks reciprocated longitudinally, said unobstructed portions being in a line with said reciprocation, means feeding all of the unseparated mass in separated longitudinal streams to the unobstructed portions substantially throughout their lengths, said sections having a plurality of riffles extending forwardly and outwardly from the center of the sections, the central portion between the inner ends of the riffles provided with escape openings substantially the length of said decks for the clean coal, the parts operating as described.

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