May 20, 1947. M. H. FIES 2,420,941

COMBINED PICKING TABLE AND SCREEN OF THE DRAG-CONVEYOR TYPE

Filed Sept. 19, 1944 3 Sheets-Sheet 1

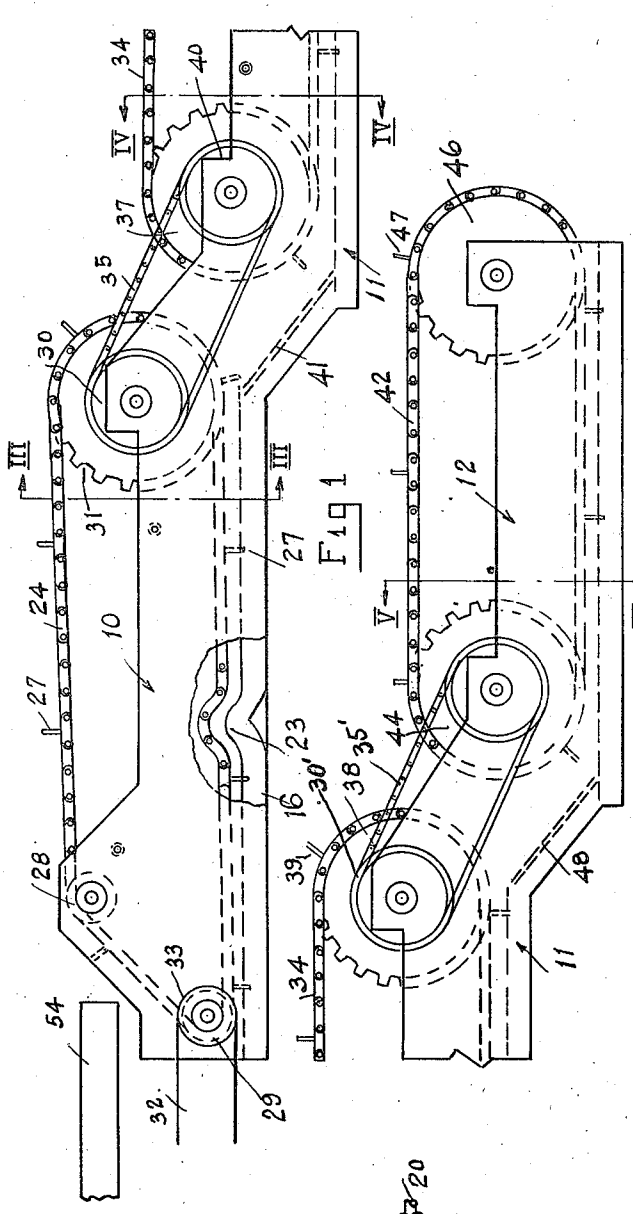


Fig 1

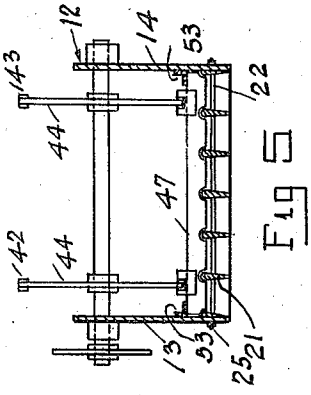


Fig 5

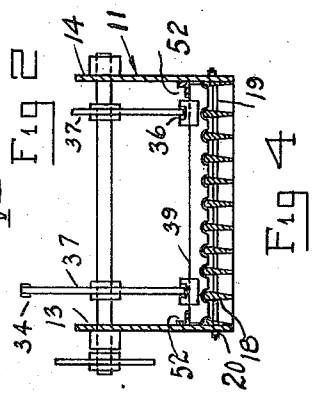


Fig 4

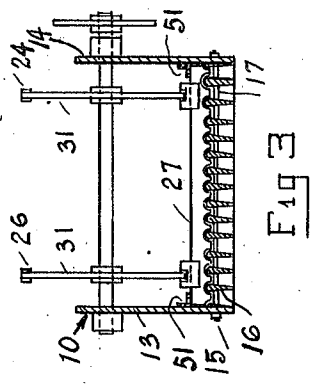


Fig 3

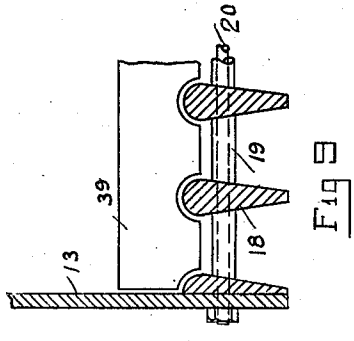


Fig 2

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Filed Sept. 19, 1944 3 Sheets-Sheet 2

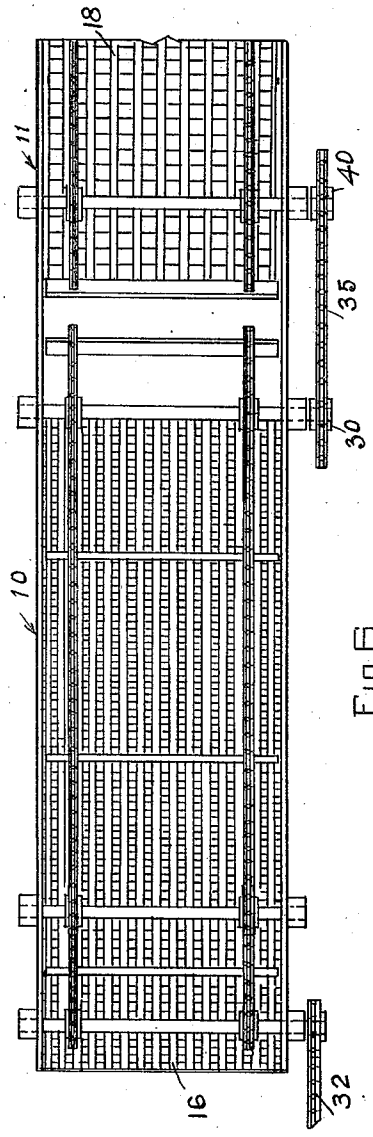


Fig 6

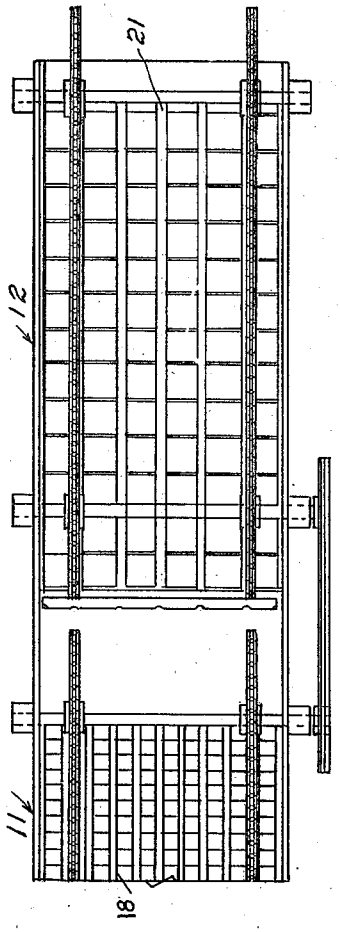


Fig 7

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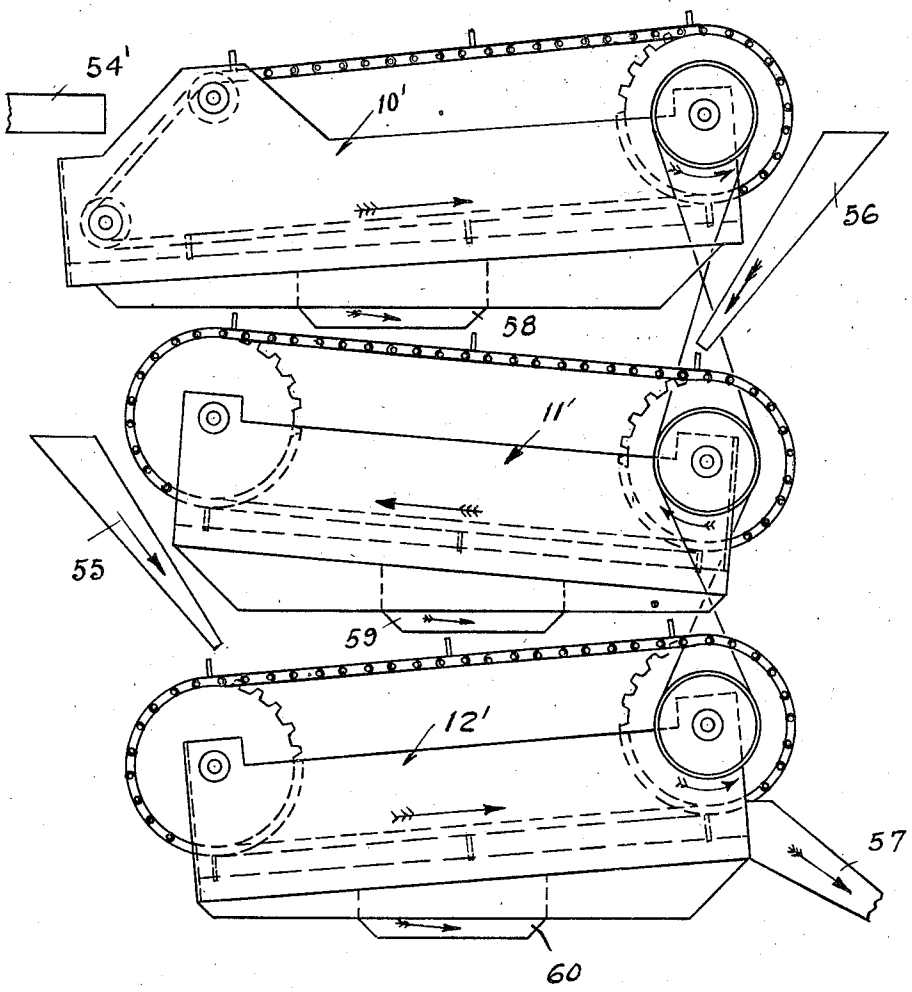


Fig 8

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UNITED STATES PATENT OFFICE

2,420,941

COMBINED PICKING TABLE AND SCREEN OF THE DRAG-CONVEYOR TYPE

Milton H. Fies, Birmingham, Ala.

Application September 19, 1944, Serial No. 554,739

3 Claims. (Cl. 209—358)

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This invention relates to a combined picking table and screen for various materials, particularly for coal, and has for an object the provision of apparatus of the character designated which shall embody relatively few moving parts, and which shall be effective to size and screen coal and other materials with a minimum of wear and tear on the apparatus and supporting structure at relatively low cost.

A further object of my invention is to provide apparatus for screening coal which shall also be adapted to be employed as a picking table from whence slate can be removed by hand.

Heretofore in this art, as known to me, it has been the practice to screen coal and similar materials by the use of vibrating, revolving, or shaking screens made of steel plates with round holes of predetermined size therein through which the coal passes. All such apparatus embodies relatively large numbers of moving parts, with a maximum of friction, and with the inevitable wear and tear brought about by the continuous starting and stopping of heavy loads. In accordance with my invention, these difficulties are overcome by providing longitudinally extending, parallel, stationary bars, with spacing members between the bars, preferably located below the level of the tops thereof, and regularly spaced according to the size of the coal to be screened to provide square holes having an area equal to the round holes heretofore employed. I provide a chain conveyor with flights relatively widely spaced thereon, and with projections extending downwardly from the flights between the longitudinal bars and clearing the cross spacing members. Coal or other material to be screened is fed onto one end of the bars in a relatively thin layer and is dragged by the conveyor flights along the bars and over the transverse spacing members, permitting the coal being screened out to pass downwardly through the openings defined by the longitudinal bars and the transverse members. By providing a succession of screens with openings of successively increasing size, and delivering the coal from one screen to another, I am enabled to screen out a variety of sizes. Other features of my invention include means for mixing the coal as it is carried along the screen bars so that an efficient screening of the coal can take place, and the provision of means for mixing the coal on the screen as it is delivered from one stage of the screen to another. In accordance with my invention, the separate screens can be arranged in horizontal series or they may be arranged one above the other. Furthermore, the screens may be arranged for the movement of the coal thereover horizontally, or they may be arranged at an angle to the horizontal so that the coal being screened is drawn upwardly or downwardly over the bars and cross members. The selection of design with respect to these particulars will depend largely on the character of material to be screened.

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Apparatus embodying features of my invention is illustrated in the accompanying drawings forming a part of this application, in which

Fig. 1 is a side elevation showing a portion of a series of screens arranged in accordance with my invention;

Fig. 2 is a continuation of the screen assembly shown in Fig. 1;

Fig. 3 is a sectional view taken along the lines III—III of Fig. 1;

Fig. 4 is a sectional view taken along the lines IV—IV of Fig. 1;

Fig. 5 is a sectional view taken along the lines V—V of Fig. 2;

Figs. 6 and 7 are plan views of the apparatus shown respectively in Figs. 1 and 2;

Fig. 8 is an elevational view showing a modified form of the invention; and

Fig. 9 is a detail sectional view showing the arrangement of the screening bars and spacers.

Referring now to the drawings for a better understanding of my invention, my improved screening apparatus embodies a series of screen sections 10, 11 and 12, having side members 13 and 14, which may be made of any suitable material but as shown herein are made of steel plate. Extending longitudinally between the sides 13 and 14 in the section 10 are screening bars 16 which are regularly spaced and which are supported by transversely extending bolts 15 which pass through tubular spacing members 17. The spacing members, as may be seen in Fig. 6, are regularly spaced to provide uniform openings of predetermined size between the bars 16 from one end to the other of the section 10. Section 11 of the screen is provided with similar longitudinally extending bars 18 which are more widely spaced. Also, the longitudinally extending bars 18 are supported by bolts 20 which pass through tubular transversely extending spacing members 19, which are regularly spaced, but more widely spaced than the bars 18, to provide larger uniform predetermined size openings through the screen section 11. The section 12 is similarly provided with longitudinally extending bars 21 supported between the sides 13 and 14 by bolts 25 and by regularly spaced, similarly mounted

spacing members 22. The bars 21 and the transverse spacing members 22 are spaced at wider intervals than the bars and spacing members in sections 10 and 11, to provide uniform size openings therebetween, which are larger than the openings through the screen sections 10 and 11. If required, additional supports for the longitudinal bars in sections 10, 11 and 12 may be provided. As will be seen by reference to Figs. 3, 4 and 5, the longitudinally extending screening bars 16, 18 and 21 are curved on their upper surfaces and are thicker at the top than at the bottom to provide downwardly flaring openings and to prevent coal or other material being screened from wedging between the bars. Preferably, the bars 16 are provided with an upward and then downward bend to form a hump 23 intermediate the ends thereof to effect a better mixing of material moving thereover.

The section 10 of my improved apparatus is provided with a conveyor made of two sprocket chains 24 and 26 having secured thereto, at relatively widely spaced intervals, transverse flights 27. The lower edges of the flights 27 are shaped to fit over the curved upper surfaces of the bars 16, and to extend downwardly between the bars a distance just sufficient to clear the transverse supporting and spacing members 15 and 17. The sprocket chains 24 and 26 are trained over sprockets 28 and 29, arranged respectively, in the upper and the lower portions of the sides 13 and 14 at the feed end of the screen, and are trained over large sprockets 31 at the discharge end of the screen. The sprocket chains 24 and 26 are driven by the sprockets 29 from any suitable source, not shown, as by means of a sprocket chain 32 and driving sprocket 33.

The section 11 is provided with a conveyor similar to that mounted in section 10, and which is comprised of sprocket chains 34 and 36, mounted on sprockets 37, at one end of the section and sprockets 38 at the other end thereof. Flights 39, similar to the flights 27, are mounted on the sprocket chains 34 and 36 and are adapted to fit over the longitudinally extending bars 18, and to extend downwardly between said bars to clear the transversely extending spacing members 19. Preferably, the section 11 is spaced at a lower level than section 10 and a plate 41 is provided at the end of the bars 16 down which the material being screened is adapted to be discharged onto the bars 18 from the bars 16. The sprockets 37 and 38 are driven from section 10 by means of a sprocket 30 at the delivery end of section 10, sprocket chain 35, and sprocket 40 mounted on section 11 and operatively connected to sprockets 37 and 38.

Section 12 of the apparatus is similarly provided with a conveyor composed of sprocket chains 42 and 43, mounted at one end of the screen over sprockets 44, and at the delivery end of the screen over sprockets 46. Flights 47 are mounted on the sprocket chains 34 and 36, to span the space between the side walls 13 and 14, and to fit over the longitudinally extending bars 21 and downwardly between the bars just above the supporting and spacing members 22. A plate 48 disposed between the side members 13 and 14 extends downwardly between the sections 11 and 12 and serves as a means for delivering the material being screened from section 11 to section 12. As shown in Figs. 1 and 2, section 11 is preferably disposed at a lower level than section 10, and section 12 at a lower level than section 11. By this means, the material

being screened is delivered by gravity from one section to the other to effect a more thorough mixing of the material. In order that the material may be evenly screened, I provide guide members 51, 52 and 53 along the side walls 13 and 14 which serve to hold the flights 27, 39 and 47, in their proper relation with respect to the screening bars. The conveyor in section 12 is driven from section 11 by means of a driving sprocket 30' and sprocket chain 35', operatively connected to sprockets 44 and 46, similar to the drive for the conveyor in section 11, already described.

In operation, material to be screened, such as coal, either dry or wet, is fed on to the left hand end of section 10, as viewed in Fig. 1, by a feeder 54 which may be a reciprocating feeder or bucket conveyor or any other known form adapted to deliver a substantially even layer of coal on the screen. The coal is engaged by the transverse flights 27 and is dragged over the screen bars, the smallest sizes falling through the small openings of section 10. The coal screened out may be carried away by any suitable means, not shown. When the coal reaches the upwardly bent section 23 of the bars 16, it is drawn to the top of the hump by the flights 27 and runs down the hump on the other side by gravity to become thoroughly remixed. There, a flight 27 picks it up again. By this time the coal reaches the delivery end of section 10, all the small particles are screened out and the coal is caused to slide down the plate 41 onto the bars 18 and cross members 19, to be acted upon in a similar manner as already described for section 10. In section 11 the intermediate sizes are screened out, and the larger sizes delivered to section 12, where the screening operation is repeated. As the coal is delivered to section 12 it slides down the plate 48 and is again subjected to a remixing action, thus assuring a more efficient screening thereof.

It will be seen from a consideration of Figs. 1 to 7 inclusive that my improved apparatus is adapted for a combined screening and picking operation. Workmen may be stationed alongside the apparatus and pick off the slate or other foreign material as the coal is conveyed over the screening bars in the several sections. After the largest size for which the apparatus is designed has been screened out in section 12, the still larger lump coal is delivered from the delivery end of the section 12.

In Fig. 8, I show a modified form of my invenvention, in which the sections 10', 11', and 12', corresponding to the sections 10, 11, and 12, already described, are disposed in superposed relation with the section 11' beneath the section 10' and the section 12' beneath the section 11'. Also, the several sections are upwardly inclined from their feed to their delivery ends whereby the coal being screened is dragged upwardly over the bars instead of horizontally as shown in Figs. 1 and 2. In accordance with this modification, coal is delivered onto the section 10' from a feeder 54' and is delivered from the section 10' onto a downwardly extending chute 56 through which it falls on to the section 11'. This arrangement gives a somewhat better mixing action than that shown in Figs. 1 and 2 as the coal is drawn upwardly along the screening bars and is delivered from one section to another. After the coal has passed over the screening bars of section 11', it is delivered onto a chute 55 down which it falls onto the screening bars in section 12'. The unscreened coal is delivered from section 12' through a chute

57. The smaller size coal screened out from section 10' is carried away through a chute 58 disposed beneath the section. Likewise, the intermediate size is carried away by means of a chute 59 beneath the section 11' and the larger size, screened out through the section 12' is carried away by a chute 60 disposed beneath that section. The conveyors employed with sections 10', 11' and 12' are similar to and are driven in a similar manner to the conveyors of sections 10, 11 and 12 and need no detailed description.

It will be apparent from the foregoing that I have devised an improved screen which is simple and sturdy of design and operation and one which is adapted for the economical screening and picking of coal. Many modifications and refinement of design may be availed of with my apparatus to suit conditions under which it may be used. For example, the screens may be downwardly inclined where desirable to aid the travel of coal thereover. Also, the feed where a bucket conveyor is employed may be timed with respect to the travel of the conveyor flights so that coal is delivered onto the screen between the flights. It will furthermore be apparent that apparatus constructed in accordance with my invention may be built and installed with a minimum of head room where such is important.

While I have shown my invention in but two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In apparatus of the character described, a screen composed of longitudinally extending parallel, regularly spaced bars thicker at the top edge than at the bottom to define downwardly diverging openings therebetween, regularly spaced transversely extending supporting and spacing members interposed between the bars to define openings of regular size therebetween, conveyor chains having flights mounted thereon at intervals and having portions extending downwardly below the tops of the longitudinally extending bars to move directly over the transverse supporting and spacing members and adapted to draw material being screened over the bars, and guide means for holding the flights downwardly in substantial engagement with the bars.

2. Apparatus as defined in claim 1 in which the longitudinally extending bars are upwardly and then downwardly bent between their ends to provide a mixing action on the material being screened as it is dragged thereover.

3. Screening apparatus consisting of a series of screen sections having progressively larger openings, and each section comprised of a plurality of longitudinally extending parallel regularly spaced bars thicker at the top than at the bottom to define downwardly diverging openings therebetween, the longitudinally extending bars of at least one of the screen sections being provided with an upwardly and then downwardly projecting portion forming a hump intermediate the ends of the section, transverse regularly spaced supporting members interposed between the longitudinally extending bars to define openings of uniform size therebetween, means to deliver material to be screened onto one end of the section having the smallest screen openings, a downwardly extending chute for delivering the unscreened coal from the first section of screen of the series onto the second, and from the second section onto the third, a conveyor for each section having transverse flights thereon shaped to fit over the longitudinally extending bars and having portions moving in relatively close clearance with respect to the transverse spacing and supporting members, and guide means for holding the flights down over the screening bars.

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