C. S. FARRER.

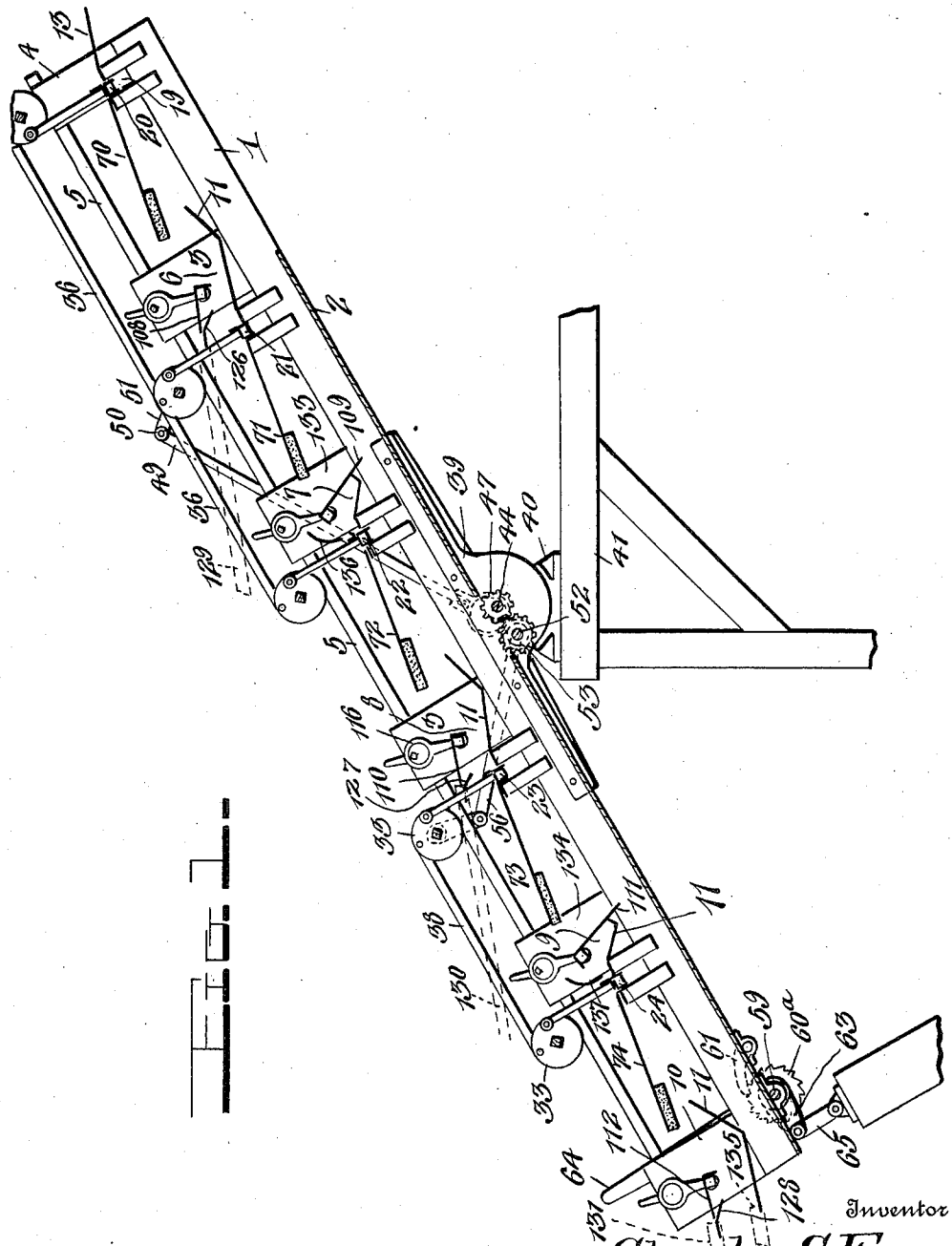
SLATE PICKER.

APPLICATION FILED JAN. 11, 1911.

1,032,477.

Patented July 16, 1912.

10 SHEETS—SHEET 1.



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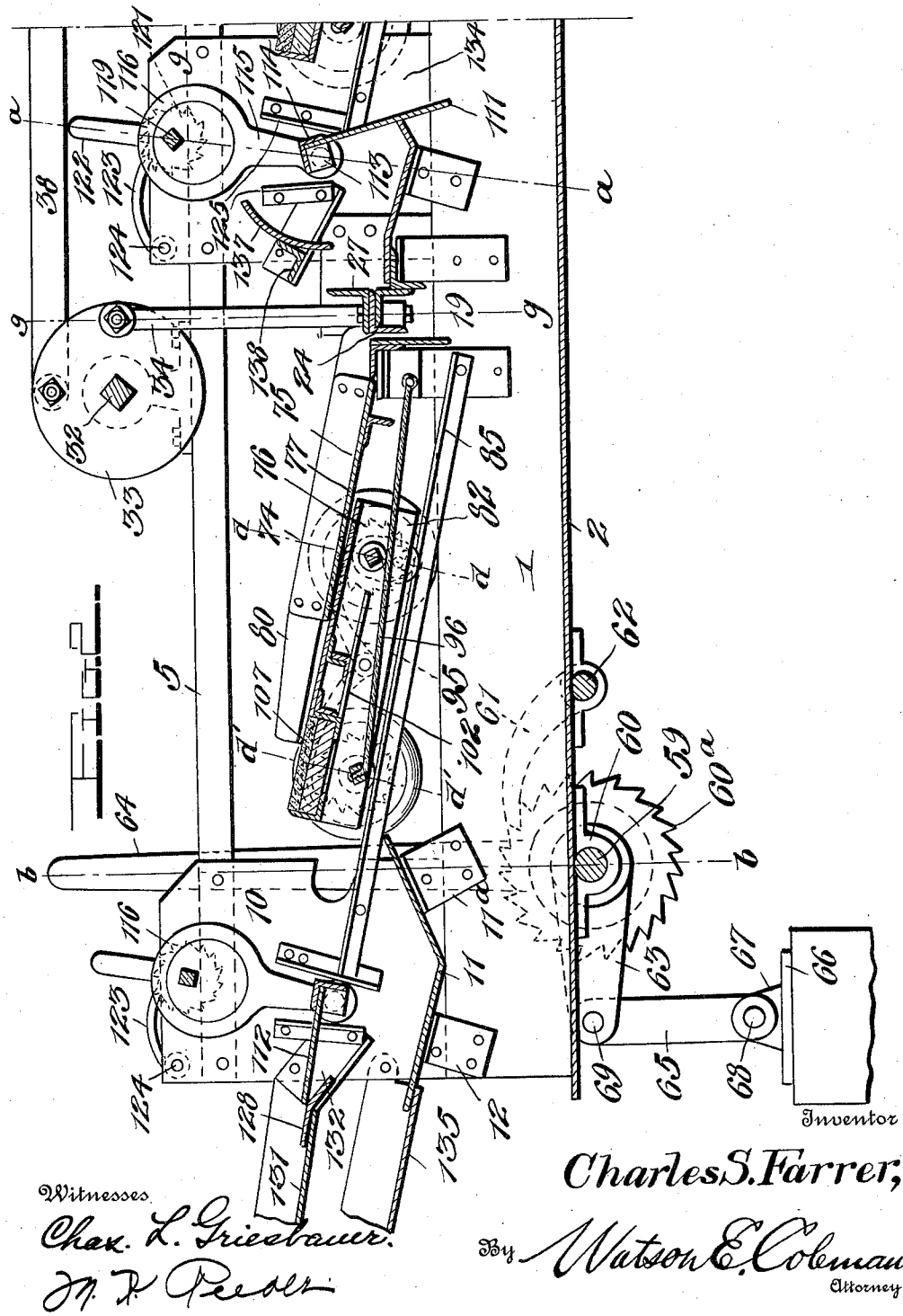

Witnesses.

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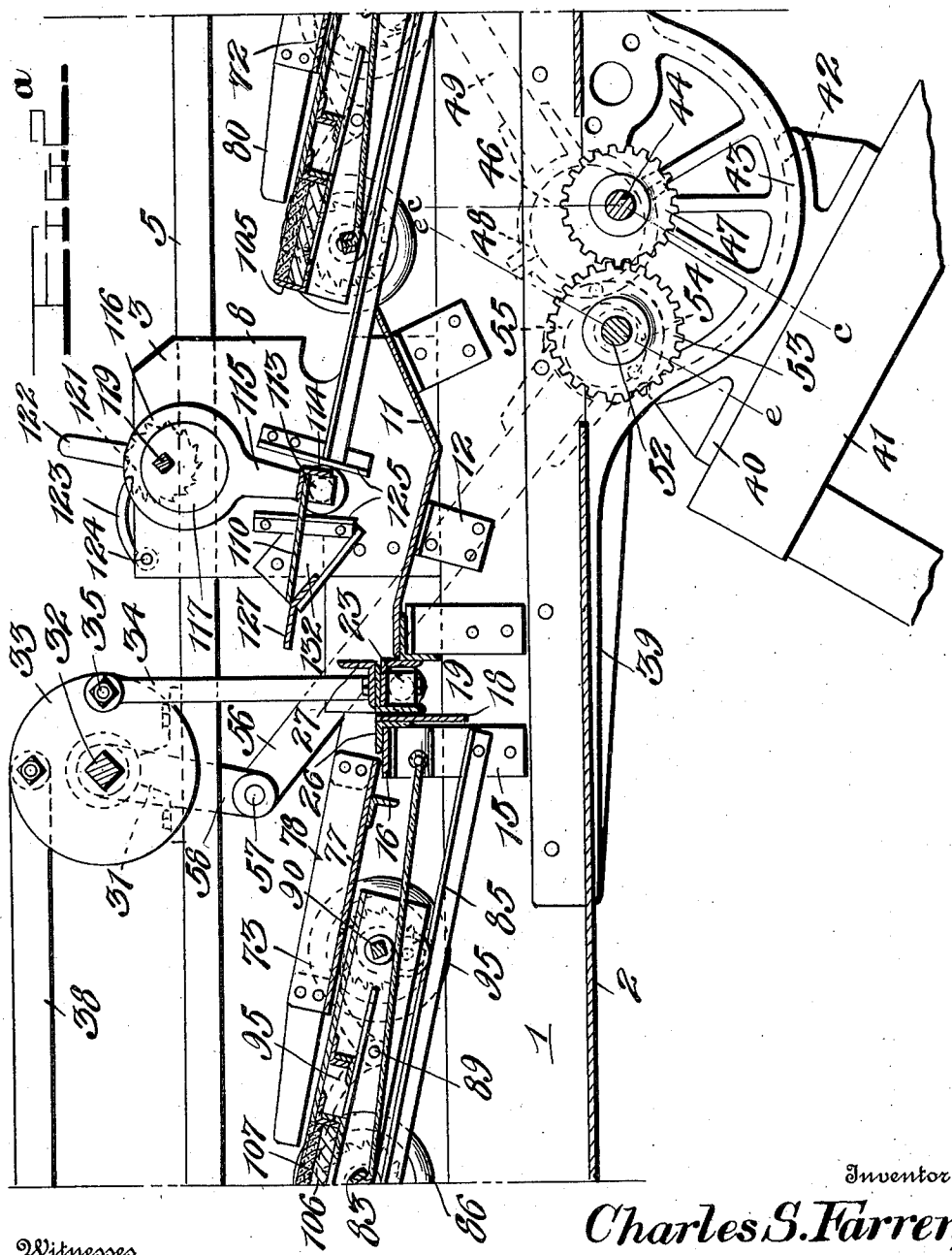

Witnesses

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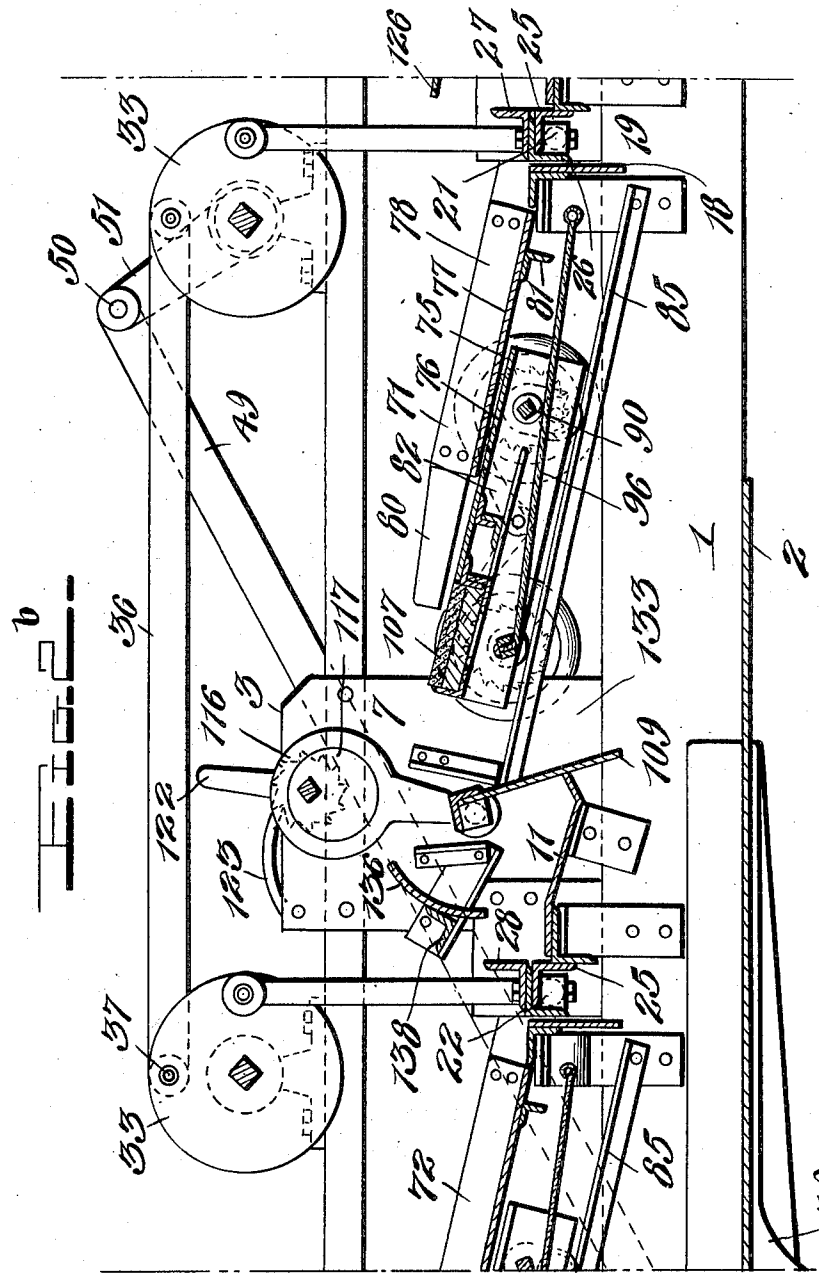

Fig. 2.

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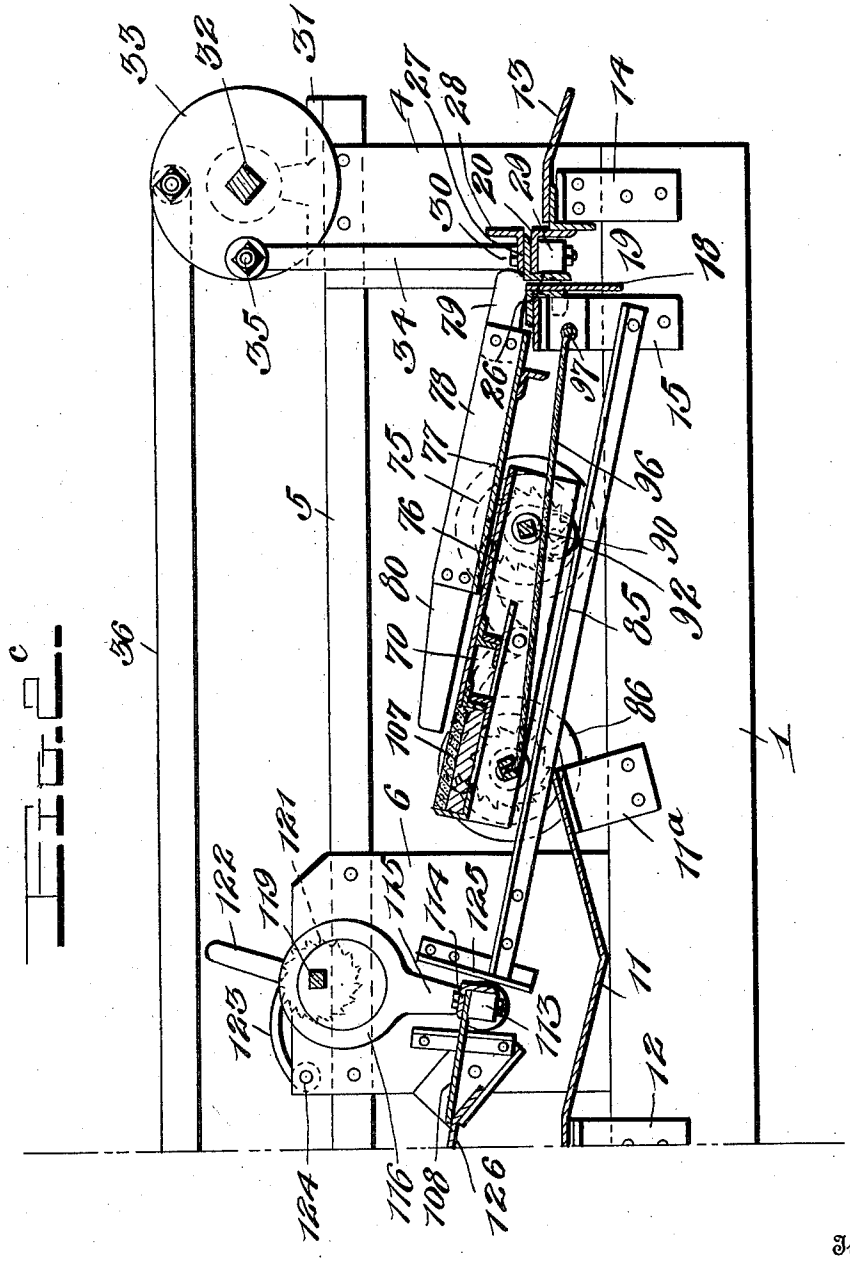

FIG. 2.

Witnesses

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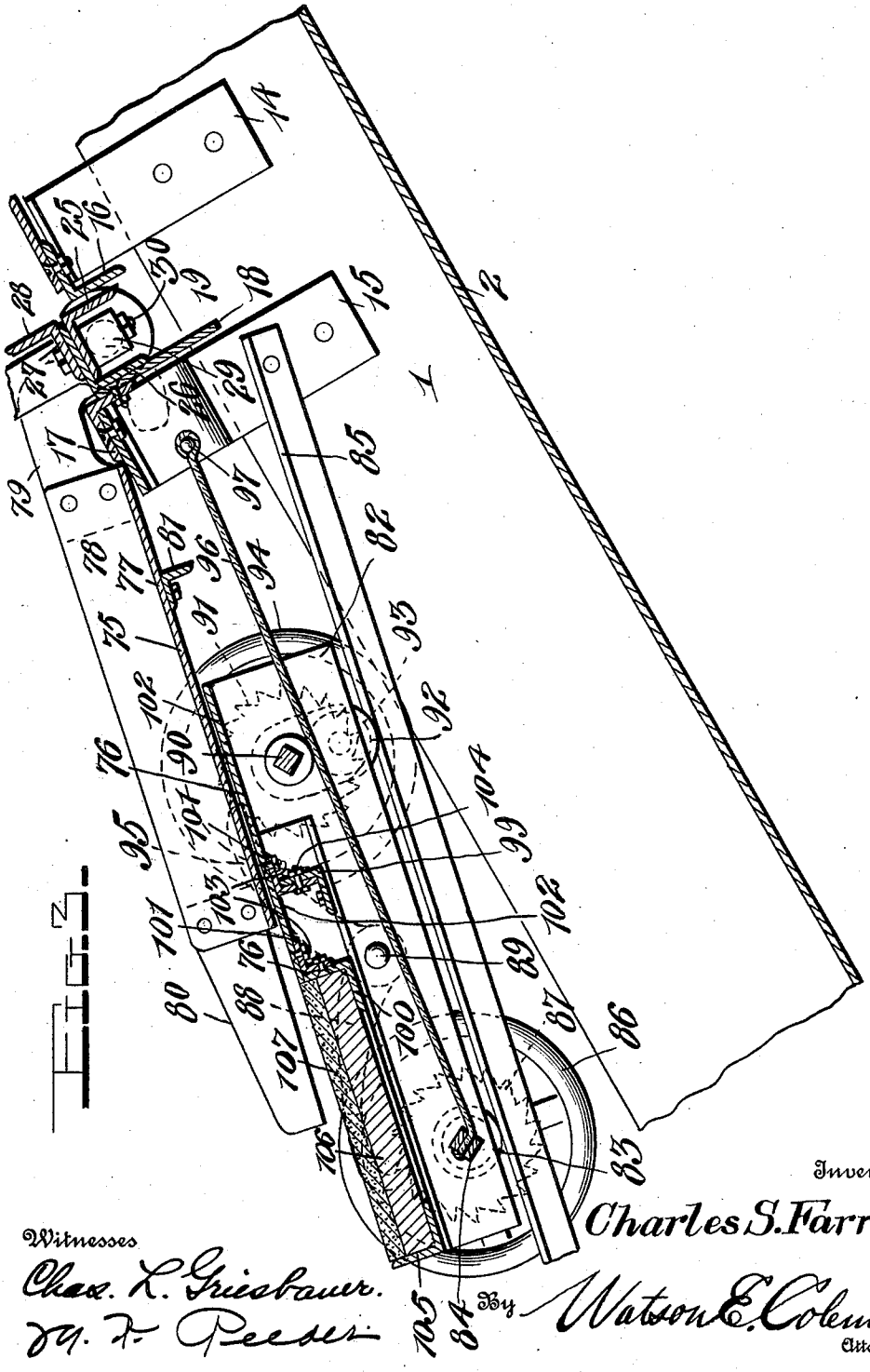

FIG. 12.

Witnesses

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10 SHEETS—SHEET 7.

Fig. 4

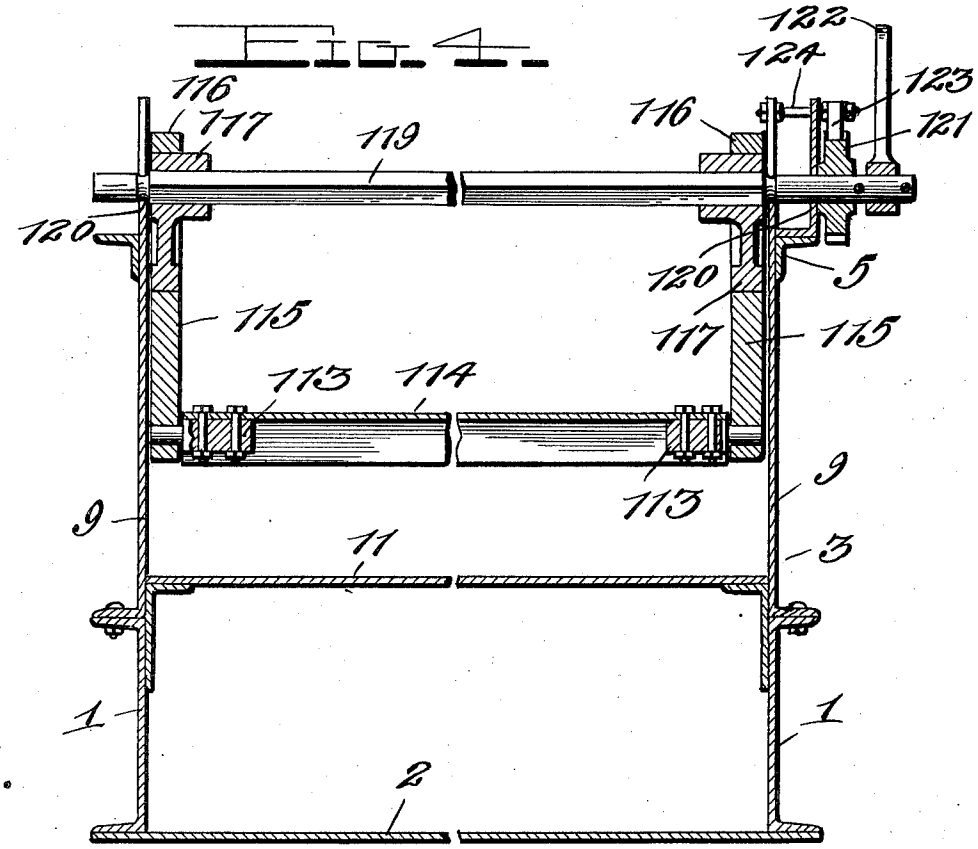


Fig. 11

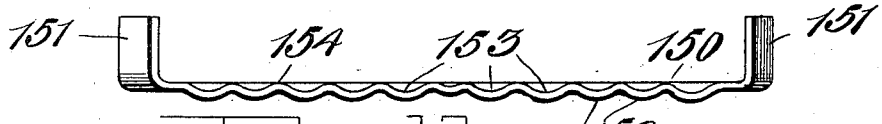
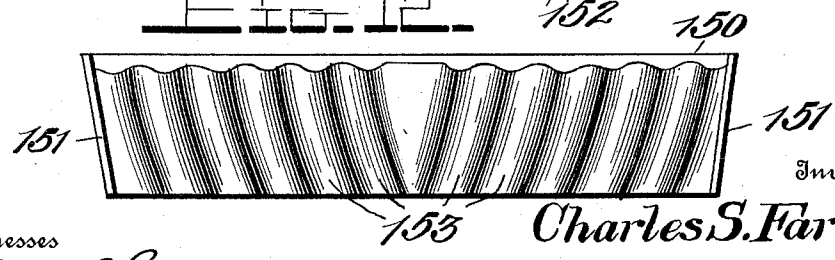


Fig. 12



Witnesses

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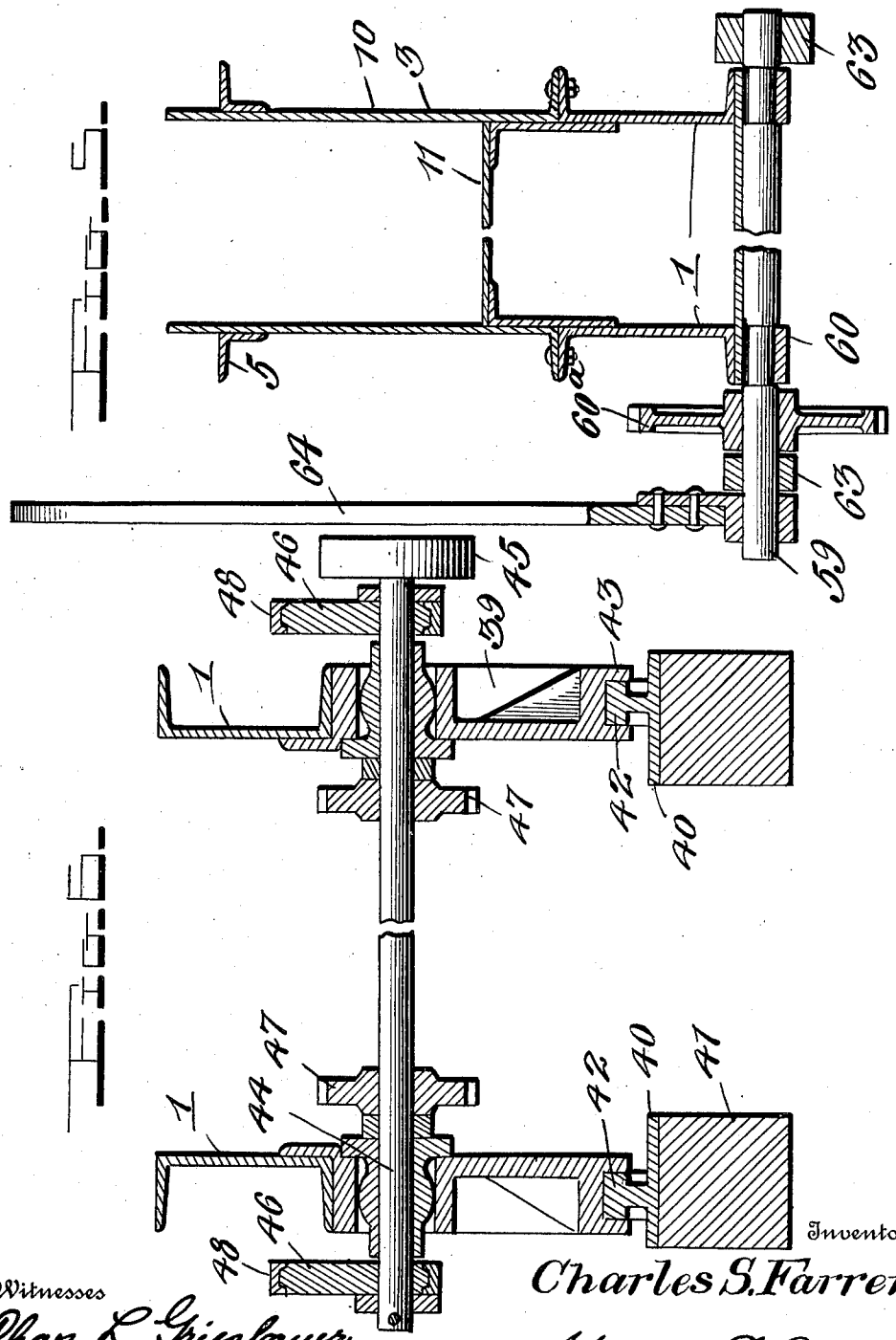

Witnesses

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10 SHEETS—SHEET 9.

Fig. 7.

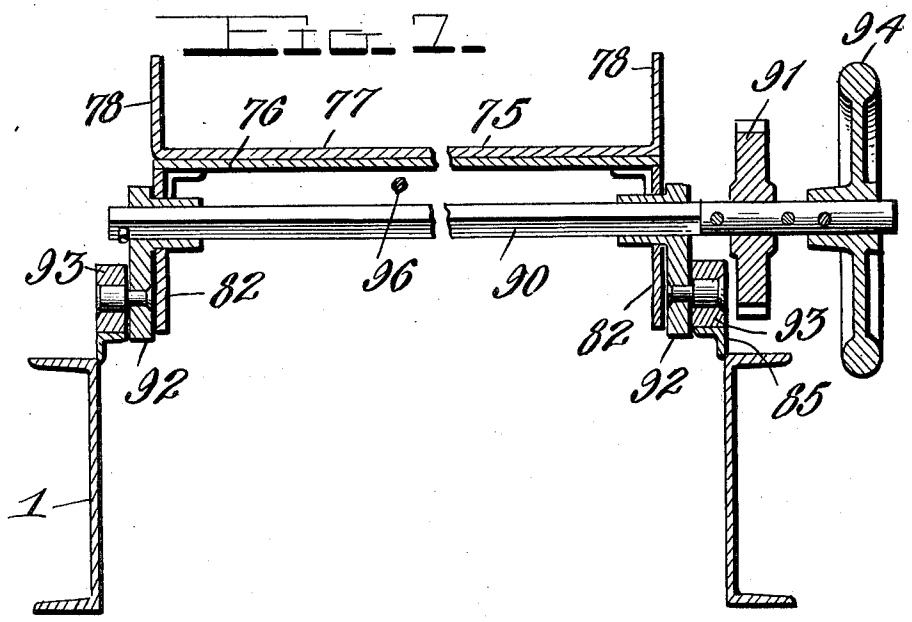
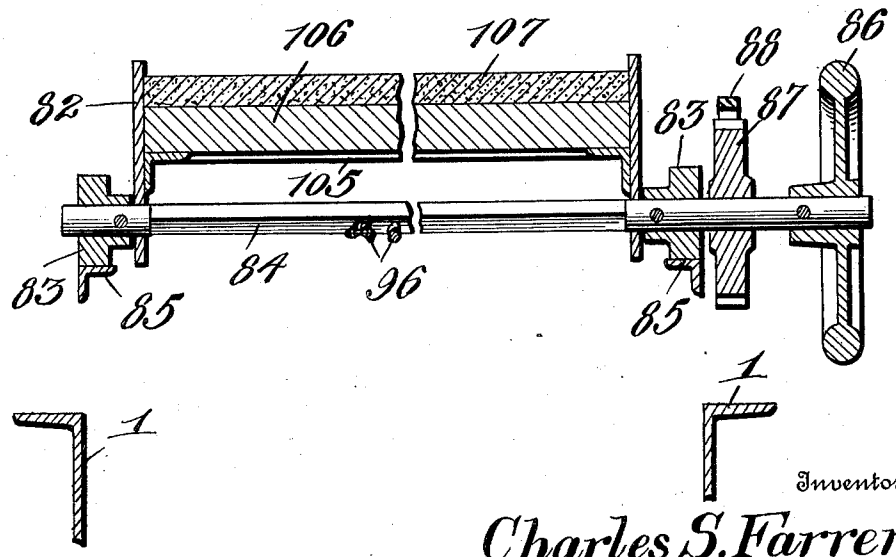


Fig. 8.



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10 SHEETS—SHEET 10.

Fig. 10.

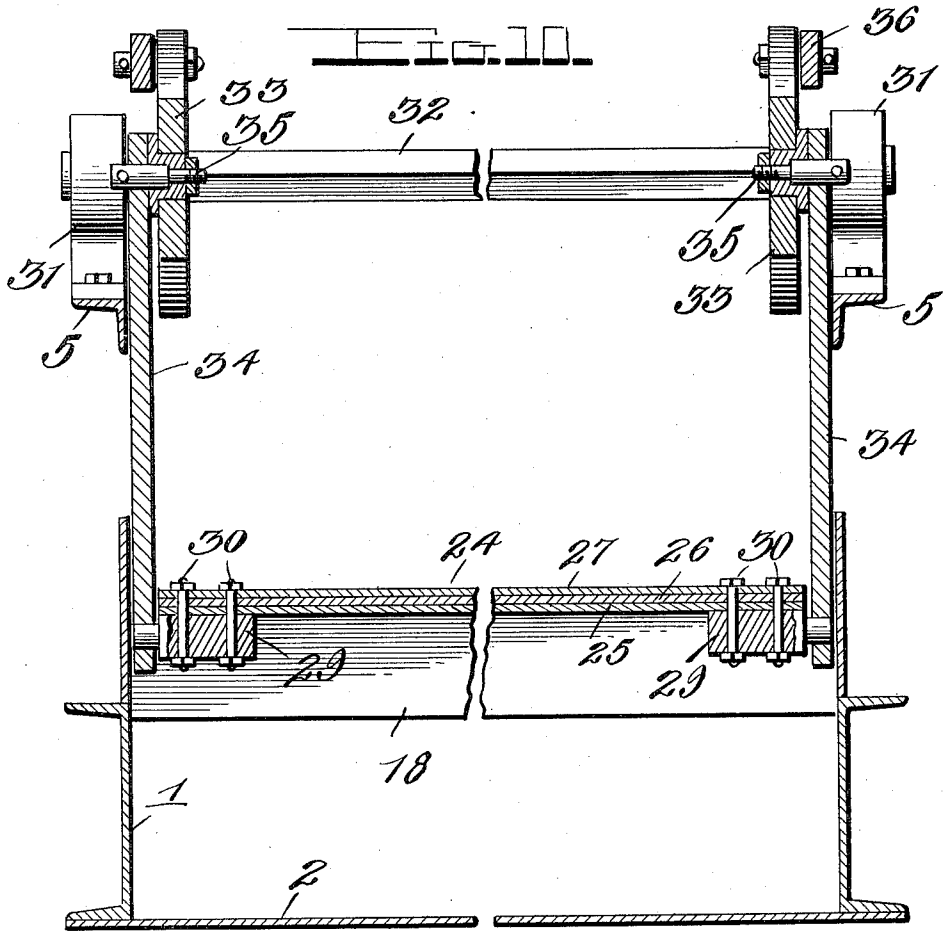
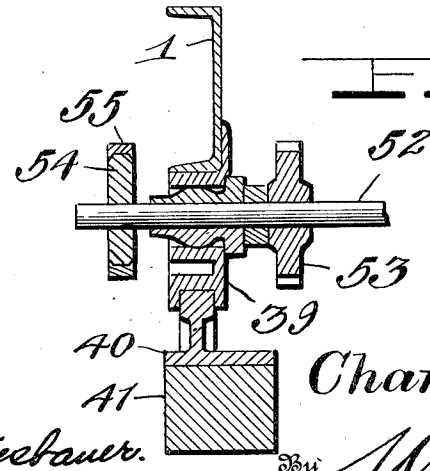


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

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SLATE-PICKER.

1,032,477. Specification of Letters Patent. Patented July 16, 1912.

Application filed January 11, 1911. Serial No. 602,078.

To all whom it may concern:

Be it known that I, CHARLES S. FARRER, a citizen of the United States, residing at Dunmore, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Slate-Pickers, of which the following is a specification, reference being had to the accompanying drawings.

This invention is an improved slate picker for separating coal from slate and consists in the construction, combination and arrangement of devices, hereinafter described and claimed.

One object of this invention is to provide an improved form of slate picking machine which is mounted for angular movement in a vertical plane, and is provided with means for adjusting the same to and securing the same at any desired inclination.

A further object is to effect improvements in the means for adjusting the slate picker.

A further object is to effect improvements in the construction of the separating chutes.

A further object is to effect improvements in the construction of the plungers which operate in connection with the coal pockets, and the separating chutes.

A further object is to provide improved means for actuating the plunger.

A further object is to effect improvements in the construction of the separating knives.

A further object is to provide a novel arrangement of the separating knives, the pockets and deflectors.

A further object is to provide improved means for adjusting the separating knives.

A further object is to effect an improved novel arrangement of the separating chutes, pockets, separating knives, slate discharge chute, and coal discharge chute, whereby the coal is graded at the same time that it is separated from the slate and boney coal, and whereby the different grades of coal are discharged independently of one another directly from the machine as rapidly as the slate is picked or separated from the coal.

In the accompanying drawings—Figure 1 is a diagrammatic longitudinal vertical sectional view of a slate picker constructed in accordance with my invention, showing the general arrangement and combination of the various parts and mechanisms thereof. Fig. 2 is a detail vertical central longitudinal section of the lower portion of the slate picker on a larger scale. Fig. 2^a is a similar view of another portion of the slate picker on the same scale as Fig. 2. Fig. 2^b is a similar view of another portion of the slate picker on the same scale as Fig. 2, and Fig. 2^a. Fig. 2^c is a similar view of the upper portion of the slate picker on the same scale as Figs. 2, 2^a and 2^b. Fig. 3 is a longitudinal sectional view of a portion of my improved slate picker on a larger scale, and showing specifically the construction of one of the separating chutes, one of the plungers, and the guides for the said plunger. Fig. 4 is a vertical transverse sectional view on the plane indicated by the line *a*—*a* of Fig. 2. Fig. 5 is a similar view on the plane indicated by the line *b*—*b* of Fig. 2. Fig. 6 is a similar view on the plane indicated by the line *c*—*c* of Fig. 2^a. Fig. 7 is a similar view on the plane indicated by the line *d*—*d* of Fig. 2. Fig. 8 is a similar view on the plane indicated by the line *d'*—*d'* of Fig. 2. Fig. 9 is a detail sectional view on the plane indicated by the line *e*—*e* of Fig. 2^a. Fig. 10 is a transverse sectional view on the plane indicated by the line *g*—*g* of Fig. 2. Figs. 11 and 12 are respectively a detail end elevation and a plan of one of the slide pans.

In the embodiment of my invention I provide a main frame which carries the slate and coal chutes and also carries all the mechanism for separating the slate from the coal and delivering the separated slate and coal into the chutes which carry them off. The sides 1 of the main frame are here shown as channel bars. A bottom 2 connects the said side bars and coacts therewith to form a slate chute. Side plates 3 which are disposed at suitable regular distances apart are arranged in pairs on opposite sides of the frame, and are here shown as having their lower ends out-turned and bolted to the upper sides of the channel bars 1. A pair of side plates 4 are also disposed at the upper end of the frame of the slate picker, and have their lower ends bolted to the upper sides of the channel bars 1. Upper bars 5 which are in practice angle bars, extend longitudinally of the frame of the slate picker, and are secured to the plates 3, 4 as shown. The plates 3 form the sides of coal pockets, of which five are here shown respectively numbered 6, 7, 8, 9 and 10, the bottom of each coal pocket being formed by oppositely inclined plates 11 which are secured on supporting knees 11^a,

12 which are bolted to the inner sides of the channel bars 1. A feed chute 13 is secured on knees 14 which are bolted to the inner sides of the channel bars 1 near the upper ends thereof. Spaced a suitable distance in front of the knees 14 and also in rear of the knees 12 are knees 15 which are bolted to the channel bars 1. The said knees 12, 14 and 15 carry transversely disposed angle bars 16. The rear knees 15 also carry angle bars 17 each of which has a horizontal web that lies on and is riveted to the horizontal web of one of the bars 16 and a vertical web 18 which extends downwardly below the vertical web of the said bar 16 so that the vertical webs of the bars 17 and the vertical webs of the bars 16 in front thereof form guideways 19 between them in which operate plungers 20, 21, 22, 23 and 24. The plungers are identical in construction and I will therefore, only describe one of them. A pair of angle bars 25, 26 are disposed with their horizontal webs in overlapping relation, one above the other, and on the angle bar 26, is an angle bar 27, the horizontal web of which bears on that of the angle bar 26, the vertical web 28 of the angle bar 27 being disposed nearest the upper or intake end of the machine, and in line with the vertical web of the angle bar 25, and forming a tongue or stop which extends upwardly. The superposed horizontal webs of the angle bars 25, 26, 27 are secured together and also to a cross bar 29 by means of bolts, rivets or other suitable devices 30.

Bearings 31 are secured on the bars 5 at suitable points, and in the said bearings are mounted rock shafts 32, each of which is provided with crank disks 33. Connecting rods 34 have their upper ends pivotally mounted on crank pins or recesses 35 with which the crank disks are provided, and their lower ends pivotally mounted on the ends of the cross bars 29. From the foregoing and by reference to the drawings, it will be understood that when oscillating motion is imparted to the crank disks, reciprocating motion is imparted to the plungers so that they alternately move downwardly and upwardly in the guide-ways 19. The three pairs of upper crank disks 33 are connected together by link rods 36 which are connected to crank pins or wrists 37 with which the said crank disks are provided. The two lower pairs of crank disks are connected together by similar links 38.

On the lower sides of the channel bars 1 at the centers thereof are secured a pair of gudgeons 39 which have their bearings on shoes 40 which are bolted on the upper side of a frame 41 of suitable height. Each of the said shoes has a segmental face 42 on which one of the gudgeons bears, and is provided at the inner side of the segmental face with a flange 43 which bears against the inner side of the gudgeon, the flanges preventing lateral movement of the gudgeons as will be understood. The gudgeons are provided with bearings for a shaft 44 which is provided at one end with a pulley 45 operated by a suitable driving belt, and the said shaft is also provided with an eccentric 46 and with a spur gear 47. The said eccentric is engaged by an eccentric strap 48 to which is attached the lower end of an eccentric rod 49, the upper end of the said rod being pivotally connected as at 50 to a crank arm 51 which is secured on one of the upper series of rock shafts 32. The gudgeons are also provided with bearings for a counter-shaft 52 to which is secured a spur gear 53 which engages the gear 47 and an eccentric 54 which is engaged by an eccentric strap 55 to which the lower end of an eccentric rod 56 is secured, the upper end of the said eccentric rod being pivotally connected as at 57 to a crank arm 58 which is secured to one of the lower series of rock shafts 32. It will be understood that when the shaft is in rotation, the counter-shaft, the eccentrics, the eccentric rods and the crank arms will impart oscillating motion to all of the rock shafts hereinbefore described, and hence the plungers will be operated.

I will now describe means coacting with the gudgeons and the bearing shoes therefor, for tilting or inclining the slate picker as may be required by the varying conditions of the work, and supporting the same at any desired adjusted inclined position.

A rock shaft 59 is mounted in bearings 60 which are secured to the under sides of the bars 1, near the lower ends thereof, and on the said rock shaft at one side of the machine, is secured a ratchet wheel 60[a] which is engaged by a pawl 61, the said pawl being pivotally mounted as at 62. The said rock shaft is also provided near its ends, with crank arms 63, and is provided at one end with an adjusting lever 64. The crank arms are connected by links 65 to plates 66 which are secured on the frame 41 or on any other suitable support, the said plates 66 being provided on their upper sides with spaced pairs of lugs 67 between which the lower ends of the said links 65 are pivotally connected as at 68, the upper ends of the said links being pivotally connected to the crank arm 63 as at 69.

It will be obvious that by a partial rotation of the rock shaft 59 imparted thereto, by the lever 64, the inclination of the slate picker may be varied at will and it will be also understood that by the engagement of the pawl 61 with the ratchet wheel 60, the slate picker will be held and maintained at any desired adjustment. By thus pivotally mounting the slate picker on the centrally disposed shaft 44 the weight of the picker is distributed at opposite sides of the

shaft, so that the slate picker is nearly balanced and hence comparatively little power need be expended in adjusting the picker to any desired angle. Another advantage is that in adjusting the picker its lower end need only be raised or lowered a slight distance as compared with what would be required to adjust the picker to the same angle if the pivotal axis thereof was at one of its ends. Another advantage is that by centrally locating the driving shaft the vibration incident to the operating of the various moving parts of the picker is greatly diminished and the various connecting rods are much shorter than would be otherwise required. Moreover, by thus centrally locating the driving shaft the latter forms the double functions of a pivot and a driving element and the tension of the driving belt on the driving pulley 45 is not affected by the angular adjustment or inclination of the picker.

My improved slate picker is provided with separating chutes, one for each coal pocket, the said separating chutes being each located in advance of and above one of the coal pockets, and being respectively indicated at 70, 71, 72, 73 and 74. These separating chutes are identical in construction and I will therefore, specifically describe only one of them. Each separating chute comprises a pair of slidably related sections 75, 76. The section 75 is in advance of and slightly above the section 76 and comprises a bottom 77 and sides 78, which may be integral, and which in practice are made of plate metal. Each upper or intake section 75 is provided at its upper end at its sides with a pair of hooks 79 which engage the knees 15 so as to secure the upper ends of the said sections, and yet permit them to be moved angularly in a vertical plane. Each section 75 is provided with side extensions 80 which extend downwardly and rearwardly from the sides thereof and beyond the bottom thereof, and are disposed above a portion of the section 76 so as to form sides thereof. The bottom of each section 75 is preferably provided on its under side with an angle bar 81 to brace and strengthen the same, the said angle bar being bolted thereto.

Each section 76 comprises a truck frame 82 having wheels 83 mounted on an axle 84, the said wheels bearing on truck rails or bars 85, which are disposed at an angle to the channel bars 1, have their upper ends secured to the knees 15, and their lower ends secured to the plates 3. Each axle 84 is provided with a hand wheel or lever 86 whereby it may be turned, and is also provided with a ratchet wheel 87 engaged by a pawl 88, the said pawl being mounted on a pivot 89. Each truck is provided near its upper end with a rock shaft 90 mounted in suitable bearings therein, and provided with a ratchet wheel 91, and also with a pair of cranks 92, each of the said cranks carrying a roller 93 which bears on one of the truck bars 85. The said rock shaft is also provided with a hand wheel or lever 94 whereby it may be turned to move the crank arms and hence cause the truck to be adjusted angularly with respect to the track bars as may be required to raise or lower the upper end of the truck and hence also raise or lower the lower end of the section 75 which bears thereon.

The ratchet wheel 91 is engaged by a pawl 95 which is mounted on the pivot 89 and coacts with the ratchet wheel 91 to secure the truck or lower member or section of the separating chute in any desired angular adjusted position with respect to the section 75 thereof. Chains, cables or other suitable flexible elements 96 have their upper ends secured to the knees 15 as by means of bolts 97, and their lower ends attached to the axle 84 as at 98. On the upper side of the truck frame of the lower section 76 at suitable distances from the front or upper end thereof are secured a pair of transversely disposed spaced angle bars 99, 100 to which are secured angle bars 101. A plate 102 which forms a portion of the bottom of the lower section of the separating chute bears at, and near its rear end on the upper sides of the said bars 101, and is secured thereto as by means of bolts 103, the bolts which secure the said bars to the bars 99 100, being shown at 104. The upper section 75 of the separating chute bears on the bottom plate 102 of the lower section of the separating chute, and is slidably related thereto, the lower section being longitudinally adjustable with respect to the upper section, so that the length of the separating chute formed by the overlapping slidably related upper and lower sections may be varied as may be required in order to dispose the lower end of the lower section at the required distance from the coal pocket below the same, and also to vary the angle between the bottom of the upper section and the bottom plate of the lower section, it being understood that the said angle is increased when the said lower section is moved upwardly or toward the intake end of the machine, and decreased when the said lower section is moved in the opposite direction. At the lower end of the truck frame of the section 76, on the upper side thereof is a transversely disposed angle bar 105 which is bolted thereon. A block 106 lies on and between the angle bars 100 and 105, and on the upper side thereof is a retarding element which forms the discharge portion of the bottom of the separating chute, the said retarding element being here indicated as a plate or block 107 of grit or emery. In order to longitudinally move the lower sections 76 of the separating chute it

is only necessary to turn the hand wheel 86 in the required direction to cause the axle 84 to partly wind up or pay out the chains 96.

Above each coal pocket is a separating blade, the said separating blades being respectively indicated at 108, 109, 110, 111 and 112. Each separating blade is secured to a cross bar 113 on one side of which and at the upper side of the blade is an angle bar 114. The ends of the cross bar 113 are pivoted to the lower ends of links 115, each of which has at its upper end, an eccentric strap 116, engaging an eccentric 117 on a rock shaft 119, the said rock shaft being mounted in suitable bearings 120, and being provided with a ratchet wheel 121, and with a lever 122 whereby it may be turned. The said ratchet wheel is engaged by a pawl 123 which has its pivot as at 124. The lower ends of the eccentric links 115 to which the separating blades are pivotally connected operate between guides 125 formed by angle plates which are secured to the inner sides of the plates 3.

In rear of the separating blades 108, 110, and 112 are feed plates 126, 127, and 128 respectively, which are disposed across the upper intake ends of coal chutes 129, 130 and 131. The said feed plates reinforce the upper ends of the said coal chutes and also form trusses, and the ends of the said feed plates are secured on brackets which are formed by angle plates 132, the said angle plates being secured to the side plates 3 and being disposed in an inclined position as shown.

It will be understood that the separating blades may be adjusted vertically by partially turning the rock shaft 119 by means of the levers 122, the co-engaging ratchet wheels 121, and pawls 123, serving to secure the separating blades at any desired adjustment. The said separating blades 108, 110, and 112 bear on the front portions of the said feed plates 126, 127 and 128. The separating blades 109, 111 are turned downwardly and bear against the front sides of the coal pockets 7, 9 respectively, openings 133, 134 being respectively formed between the said downwardly inclined separating blades and the rear ends of the separating chutes 71, 73 through which openings slate is enabled to drop into the slate chute 2. A coal chute 135 extends from the coal pocket 10 in rear of and below the separating chute 74. Dashers 136, 137 are respectively arranged in rear of the upper portions of the separating blades 109, 111 and are secured to and separated by transversely disposed angle bars 138.

In the operation of my improved slate picker, the reciprocating plungers regulate and control the passage of the material over the various inclined planes presented by the chutes and the separating chutes, each plunger when raised causing its tongue which extends above the plane with which it coacts, to arrest the material momentarily above the plunger. As each plunger descends, it coacts with the guides 16, 17 to form a pocket above the plunger and between the guides, which pocket becomes filled with material that passes over the tongue, and on the next ascent of the plunger, the material from the said pocket is discharged to the inclined plane below the said plunger as will be understood.

For the purposes of this specification, I have shown and described my improved slate picker as a five drop machine, that is to say, it is provided with five separating chutes, but the number of separating chutes and consequently also the number of coal pockets, plungers and blades may be varied at will.

In the operation of my improved machine, assuming that the same has been adjusted to the required angle, according to the condition of the coal as to whether it is wet or dry, and according also to other conditions, and also assuming that the separating chutes and separating blades have been properly adjusted, the material, coal mixed with slate, as it comes from the machine is discharged on to the feed plate, chute or inclined plane 13 and from there by action of the plunger 20 is fed to the separating chute 70. The momentum of the coal which passes down from the said separating chute 70 is such that the lighter coal falls upon the separating blade 108 and passes therefrom on to the coal chute 129 which discharges it from the machine. The slate and slaty or boney coal is retarded by the retarding element or grit plate 107 of the said separating chute 70 and drops therefrom into the pocket 6. From the said pocket the material is fed by the action of the plunger 21 to the second separating chute 71, the lighter coal by its momentum, passing over the separating blade 109, striking against the dasher 136, and being deflected thereby downwardly into the pocket 11 while the slate owing to its being retarded by the retarding element at the discharge end of the said separating chute 71 strikes against the separating blade 109, and is directed thereby downwardly through the opening 133 from which it drops on to the chute 2 which serves to discharge the slate from the machine. The plunger 22 operates to cause the coal to pass from the pocket 11 on to the separating chute 72 which serves to separate the slate from the coal, the latter by its momentum passing from the said chute 72 on to the separating blade 110 and from thence to the coal discharge chute 130 while the slate and slaty or boney coal by the retarding action of the element 107 of the

said separating chute 72 drops therefrom into the pocket 8. From the said pocket the material is caused to pass by the action of the plunger 23 to the separating chute 73, the retarding element of which causes the slate to strike the separating blade 111, and be discharged through the opening 134 into the slate discharge chute 2, the coal by its momentum passing from the said separating chute 73 over the separating blade 111, striking the dasher 137 and being thereby deflected into the pocket 9. From the said pocket the material by the action of the plunger 24 is caused to pass on to the chute 74 from which the coal by its momentum is discharged on to the separating blade 112 and from the same on to the coal chute 131, the slaty or boney coal by the action of the retarding element of the said separating chute 74 dropping into the pocket 10 and being from thence discharged by the chute 135 for crushing and reworking.

The theory of operation of my improved five drop tandem slate picking machine is as follows: In the material, coal mixed with slate, as it comes from the mine, delivered to the machine, the coal predominates, is separated from the slate, and by the coaction of the first separating chute 70, separating blade 108, and chute 129 is at once discharged from the machine. The major portion of the material which drops from the first separating chute 70 into the pocket 6 is slate, and this material is treated by the second separating chute 71, and the reversed separating blade 109, the slate being at once discharged from the said second separating chute by the said reverse blade through the opening 133 into the slate chute 2, and hence from the machine, while the coal passes over said reversed blade 109 into the pocket 11, the material which drops into the said pocket being principally coal. This material is treated by the third separating chute 72 and the major portion thereof being coal, is discharged therefrom on to the separating blade 110, and at once taken off from the machine by the chute 130, such material as fails to drop upon said blade 110 falling into the pocket 8. Of this material which thus falls into the pocket 8, the major portion is slate and such material is treated by the fourth separating chute 73 with which the reversed separating blade 111 coacts to discharge the major slaty portion, through the opening 134 into the chute 2 while the lighter portion mainly coal, passes from the said separating chute 73 over the blade 111, and falls into the pocket 9. Of the material which reaches this pocket, the major portion is coal, and this is delivered by the action of the separating chute 74, and the blade 112 on to the chute 131, the residue which is slate or boney coal, dropping from the said separating chute 74 into the pocket 10 and being carried off from the machine by the chute 135 for crushing and reworking. Hence it will be understood that at the first and each alternate drop, the coal which constitutes the major portion of the material is at once discharged from the machine, and at each intermediate drop, the slate which constitutes a majority of the material is at once discharged from the machine through the slate chute, and the residue retreated.

In Figs. 11 and 12 of the drawings, I show a preferred and improved form of retarding element for the separating chutes, the same comprising a metallic pan 150 having side walls 151 which converge downwardly or toward the discharge end of the chute on which the pan is used, and the bottom 152 of which pan is provided with longitudinally curved corrugations which form correspondingly curved channels 153 in the upper surfaces of the bottom pan and correspondingly curved ridges 154 which separate and are disposed between the said channels. The ridges of the corrugations form bars on the upper surface of the bottom of the pan, the depressed portions of the corrugations forming the channels between the bars. The cords of the arcs formed by the said longitudinally curved channels converge toward the discharge end of the pan and hence material passes over the bottom of the pan, and is deflected by the said curved channels toward the center of the pan before being discharged therefrom.

The pieces of slate which are intermixed with mined coal are almost invariably relatively long, so that one dimension thereof greatly exceeds the other dimensions while the pieces of coal are more nearly cubical in form. By the provision of the longitudinally curved channels in the bottom of the retarding pan, the pieces of slate are deflected from a right line, as it passes down over the pan, and directed in an oblique line as they are discharged therefrom, so that they fall short of the coal which by reason of its shorter length does not become deflected by the longitudinally curved channels to nearly so great an extent as the pieces of slate. Hence the slate which falls short of the coal falls directly through one of the openings, and into the slate discharge chute while the pieces of coal pass over the separating knife below the chute as will be understood.

I claim:—

1. A slate picker of the class described comprising a frame and slate picking mechanism carried by the frame and including movable plungers, gudgeons on the under side of the said frame at a point intermediate its ends and provided with bearings, a support having shoes on which the gudgeons have their bearings, a driving shaft

mounted in the bearings in the gudgeons and operating mechanism for the plungers, carried by the said frame and connected to and driven by the said driving shaft.

2. A slate picker of the class described comprising a frame and slate picking mechanism carried by the frame and including movable plungers, a driving shaft mounted at a point intermediate the ends of the frame, pivotal supports for the frame, concentric with the said driving shaft, whereby the driving shaft constitutes the pivotal axis of the frame and the said frame is adapted for vertical angular adjustment, means to adjust the said frame and support the same at any desired inclination and operating mechanism for the plungers, carried by the frame and connected to and driven by the said driving shaft.

3. A slate picker of the class described comprising a frame and slate picking mechanism carried by the frame and including movable plungers, a driving shaft mounted at a point intermediate the ends of the frame, pivotal supports for the frame, concentric with the said driving shaft, whereby the driving shaft constitutes the pivotal axis of the frame and the said frame is adapted for vertical angular adjustment, means to adjust the said frame and support the same at any desired inclination, eccentrics on the driving shaft, rocking elements carried by the frame and connected to the plungers, and eccentric rods connected to the rocking elements and having eccentric straps engaging the eccentrics of the driving shaft.

4. A slate picker of the class described having an inclined plane, and an inclined separating chute, spaced from the said plane, a guide-way between the said plane and said separating chute, and presenting a pair of spaced vertical walls between the opposing ends of and extending transversely across the inclined plane and the separating chute, and a plunger movable in the said guide-way, the said plunger having an upwardly extending tongue on its upper side to form a pocket, when said plunger is in lowered position in the guide-way.

5. In a machine of the class described a plunger comprising a pair of lower angle bars having their upper webs disposed in overlapping relation, and an upper angle bar having its lower web bearing on the uppermost web of the first mentioned angle bars, the upright web of the last mentioned angle bar forming a tongue extending above the said plunger.

6. In a machine of the class described, a plunger comprising a cross bar, a pair of angle bars arranged in reverse order with their upper webs in overlapping relation, and their depending webs on opposite sides of said cross bar, and an upper angle bar having one of its webs bearing on the upper web of one of the said pair of bars, and its other web extending upwardly from the front side of the plunger and forming a tongue thereon.

7. In a machine of the class described, the combination of an inclined slate chute, a separating chute above the slate chute, a pocket below the lower end of said separating chute, a deflector above the rear portion of said pocket, and a separating knife in advance of the deflector, and spaced from the rear of the separating chute, said knife extending downwardly and bearing against the front side of the pocket.

8. In a machine of the class described, a frame having an inclined track, and a separating chute carried by said frame, said separating chute comprising an upper member connected at its upper end to the said frame for angular movement in a vertical plane, and a lower member mounted on said track and on the front upper portion of which the rear lower portion of said upper member bears, means to longitudinally adjust said lower member, and means to vary the inclination thereof, and hence cause the same to also vary the inclination of the upper member.

9. In a machine of the class described, the combination of a frame having an inclined track, and a separating chute comprising an upper member connected at its upper front end to the frame for angular movement in a vertical plane, and a lower member on which the rear portion of the upper member bears, said lower member having a retarding element extending below and beyond said upper member, the latter having vertically extending walls forming sides above the said lower member, said lower member being mounted and adjustable longitudinally on said track.

10. In a machine of the class described, a chute, knees secured to the sides of the chute, a cross bar connecting the knees, a supporting track carried by the chute and a separating trough comprising a lower member and an upper member, said lower member being disposed adjustably on the track, and the said upper member bearing at its rear portion on the said lower member, and being provided at its front upper end with hooks, engaging the said knees, and connecting said upper member to the said knees for vertical angular movement of said upper member.

11. In a machine of the class described, a chute, knees secured to the sides of the chute, a cross bar connecting the knees, a supporting track carried by the chute and a separating trough comprising a lower member and an upper member, said lower member being disposed adjustably on the track, and the said upper member bearing at its rear portion on the said lower member, and being

provided at its front upper end with hooks, engaging the said knees, and connecting said upper member to the said knees for vertical angular movement of said upper member, said lower member being provided also with means for vertically adjusting the upper front end thereof.

12. In a machine of the class described, a chute having side walls, a separating chute between the said side walls, a plunger operating at the discharge end of the said separating chute, a rock shaft and bearings for the rock shaft in the sides of the first mentioned chute, and movable angularly in said bearings to admit of flexibility and lost motion between said shaft and the said chute, and means operated by the said rock shaft to actuate the said plunger.

13. In a slate picker of the class described, comprising a main frame, coal picking mechanism, including movable plungers, carried by the main frame, gudgeons on the under side of the main frame at points intermediate the ends thereof, a support having shoes provided with bearings in their upper sides for the gudgeons whereby the main frame is pivotally mounted on the support for angular movement in a vertical plane, means to adjust the main frame, operating means for the plungers, carried by the main frame, a driving shaft, arranged transversely of the main frame, spherical sleeves therefor having their bearings in the gudgeons, and a connection between the driving shaft and plunger operating mechanism, to cause the plungers to operate and to be driven from the driving shaft.

14. An inclined retarder of the class described, having a bottom provided on its upper surface with downwardly converging ribs and channels.

15. An inclined retarder of the class described, having a bottom provided on its upper surface with downwardly converging longitudinally curved ribs and channels.

16. In a machine of the class described the combination of a frame, an inlet at one end for the material to be sorted, a series of inclined separating chutes spaced apart longitudinally of the frame, feeding devices at the entrance to the chutes, a slate discharge beneath the chutes, coal discharges arranged in the alternate spaces between the chutes, blades arranged in the spaces between the chutes, the alternate blades directing the material from the preceding chute one directing a portion into the coal discharge and a portion into the succeeding chute and the next a portion into the slate discharge and another portion into the succeeding chute.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CHARLES S. FARRER.

Witnesses:

ELIZABETH O. FARRER,

S. B. BULKLEY.