C. W. HONABACH.

COAL AND SLATE SEPARATOR.

APPLICATION FILED APR. 16, 1910.

983,283.

Patented Feb. 7, 1911.

4 SHEETS—SHEET 1.

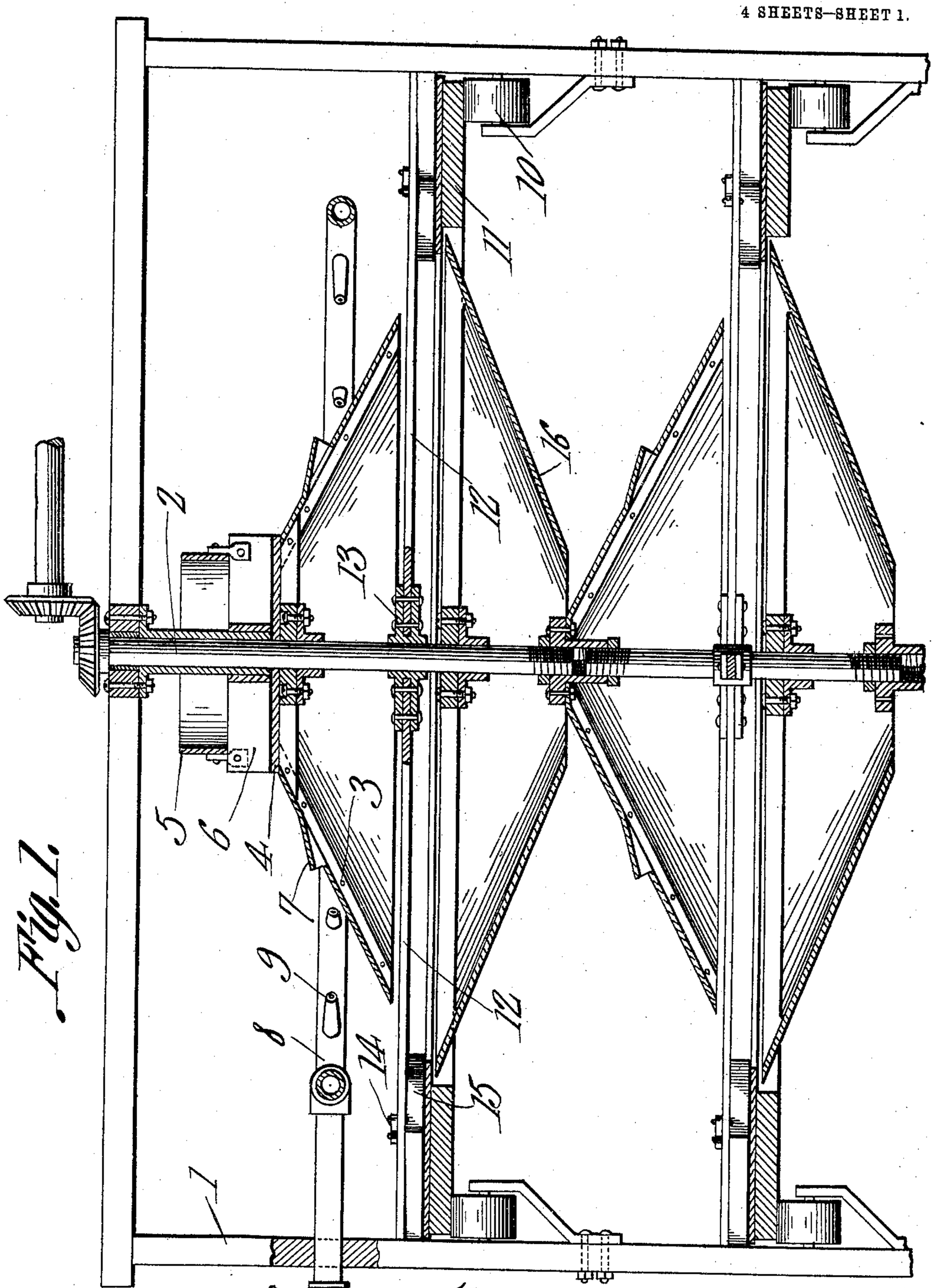

Fig. 1.

Witnesses

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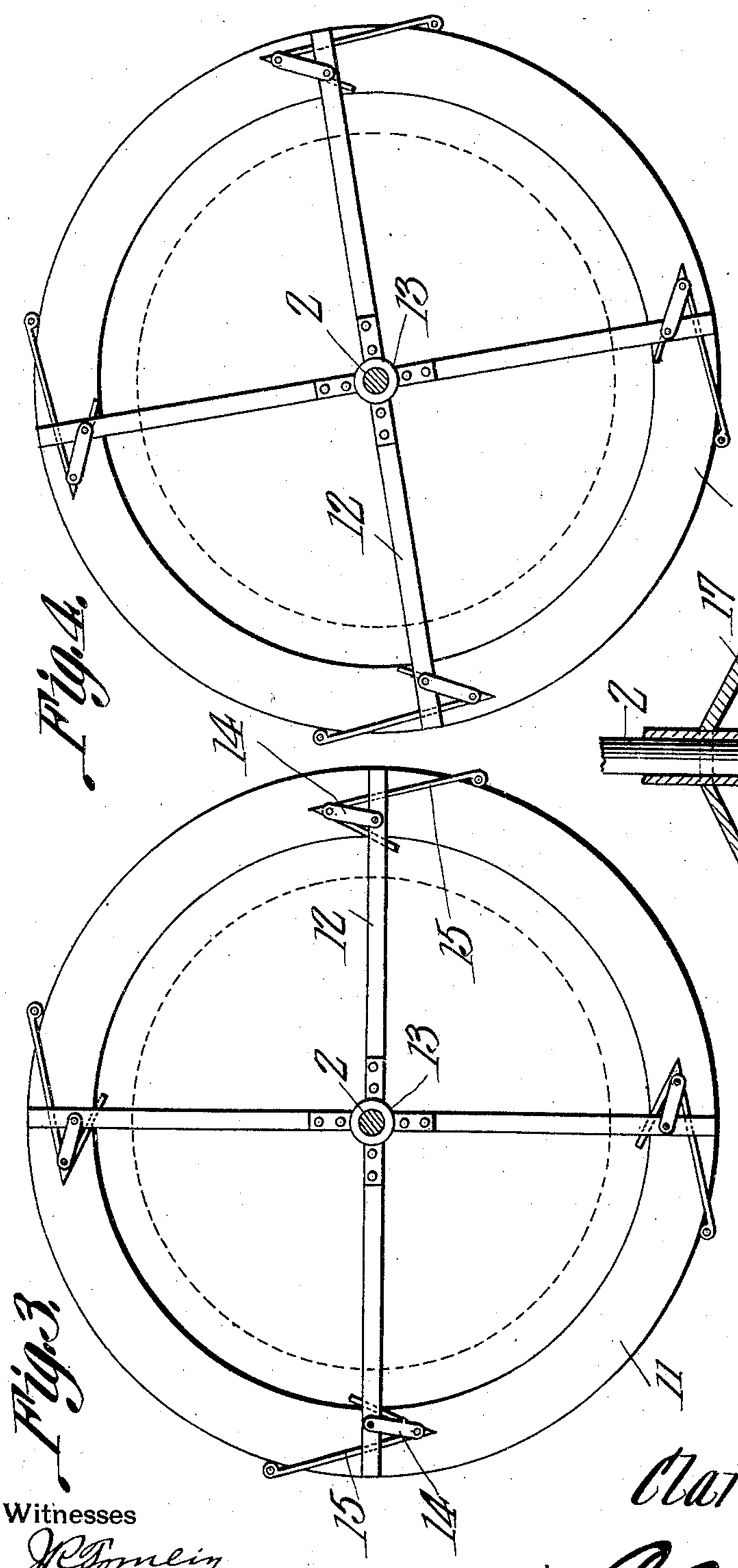

Fig. 3.

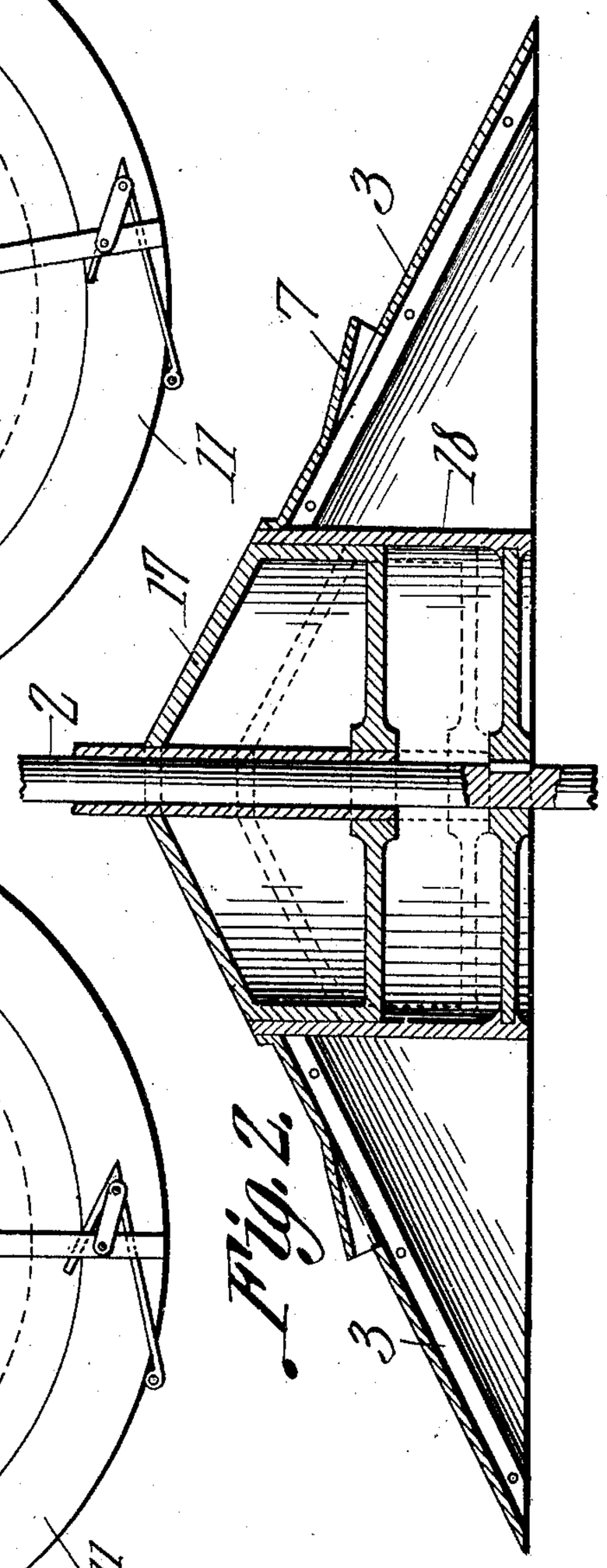

Fig. 2.

Witnesses

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4 SHEETS—SHEET 3.

Fig. 10.

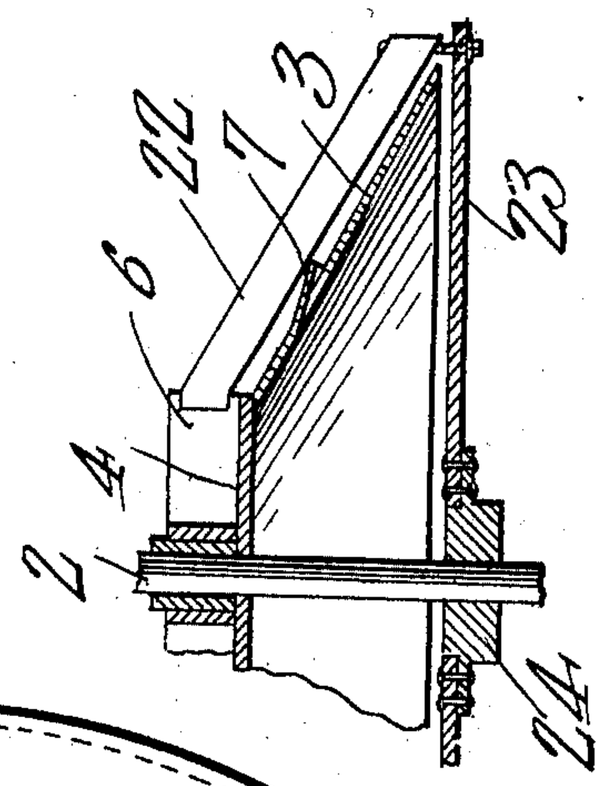
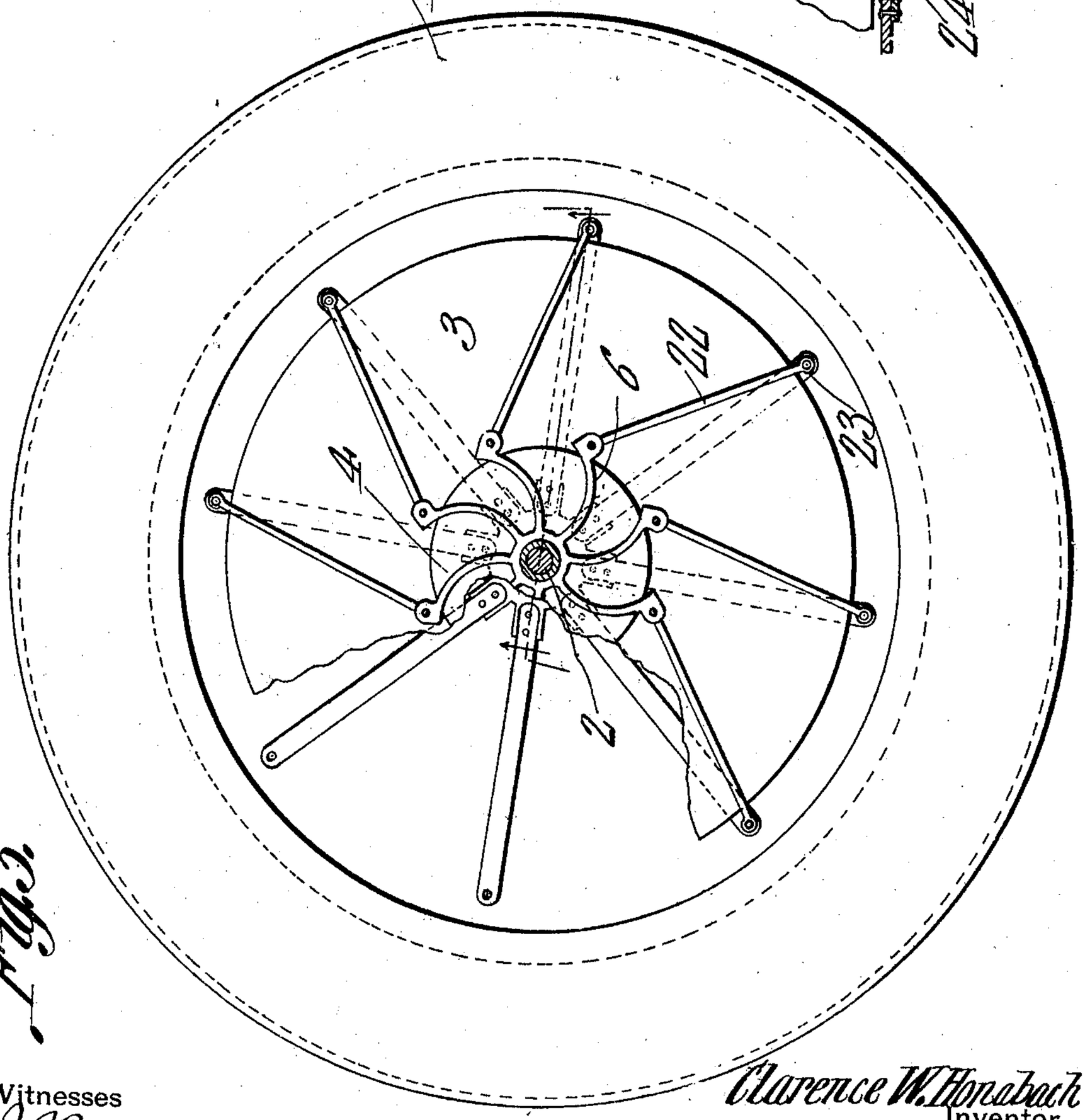


Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

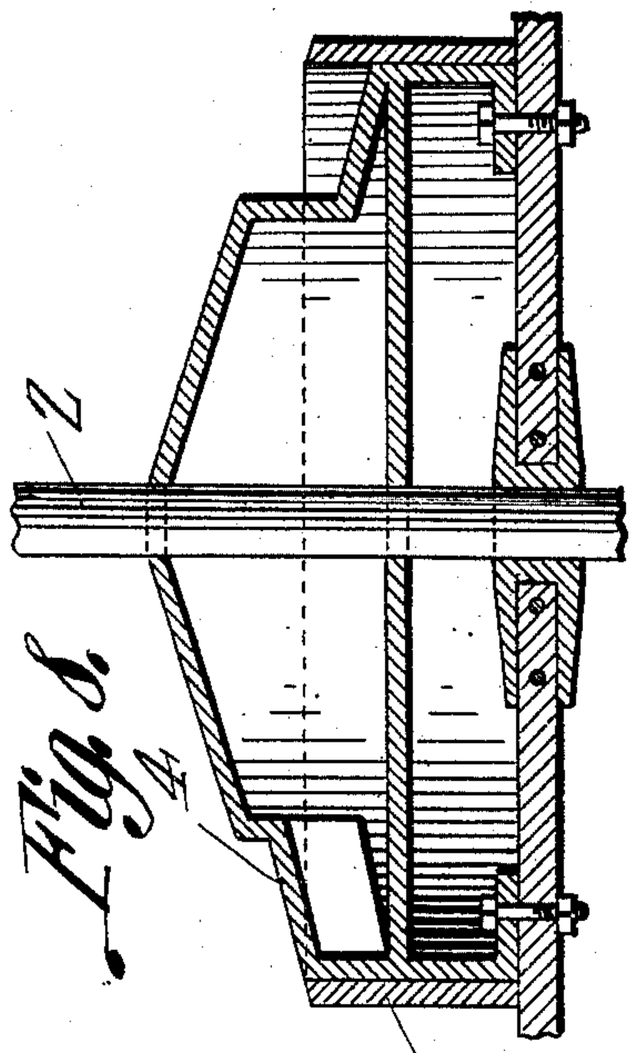


Fig. 8.

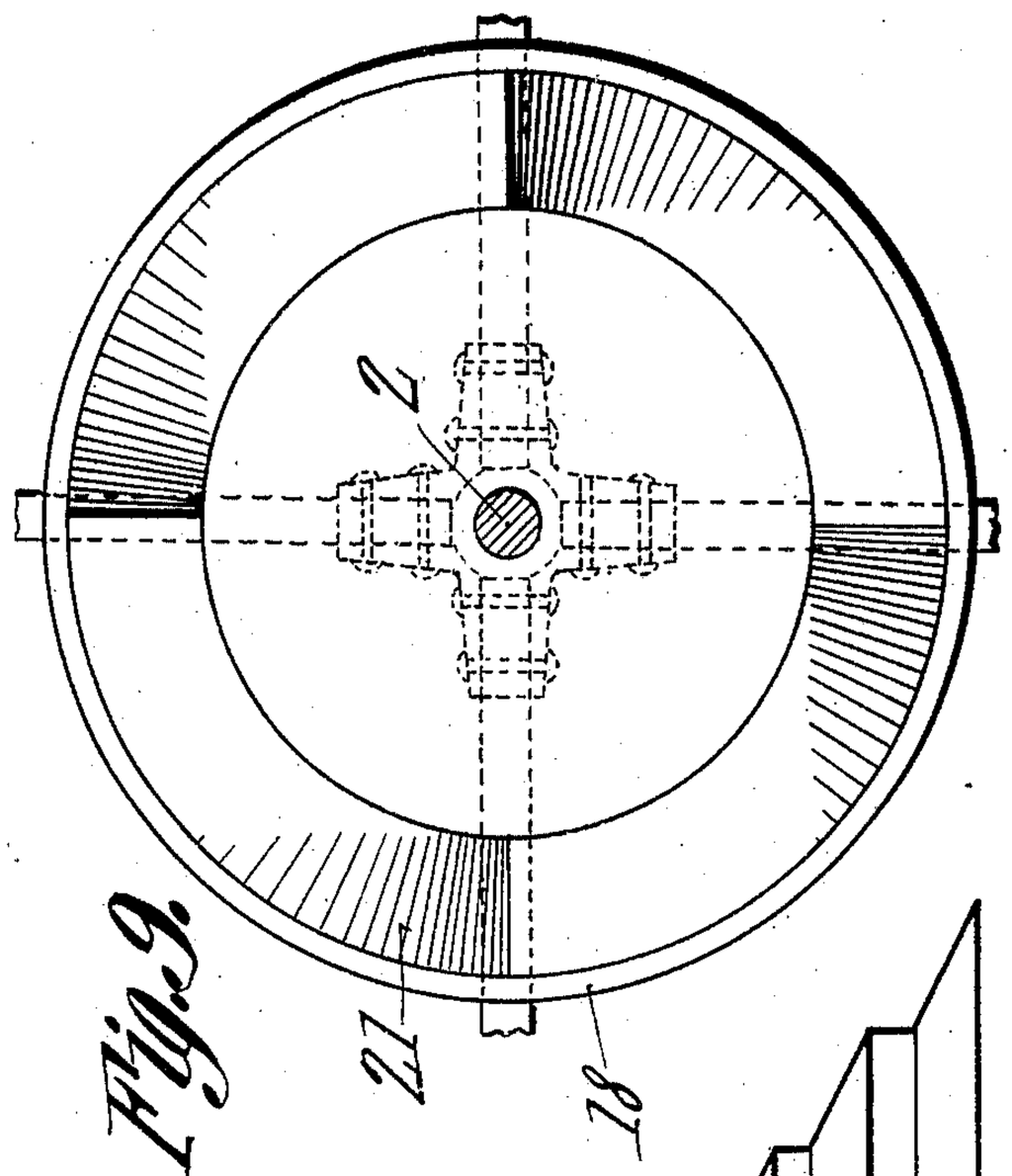


Fig. 6.

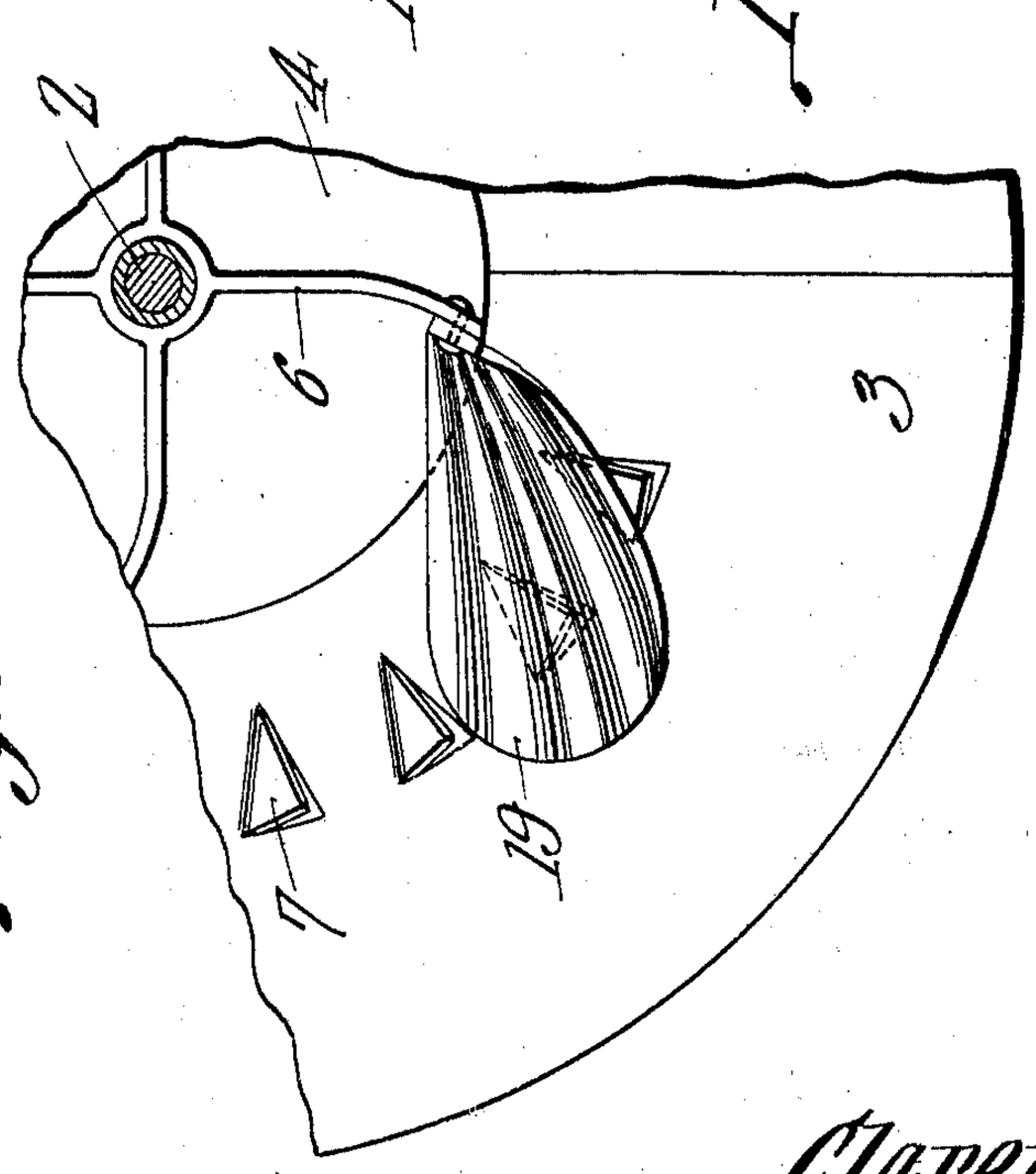
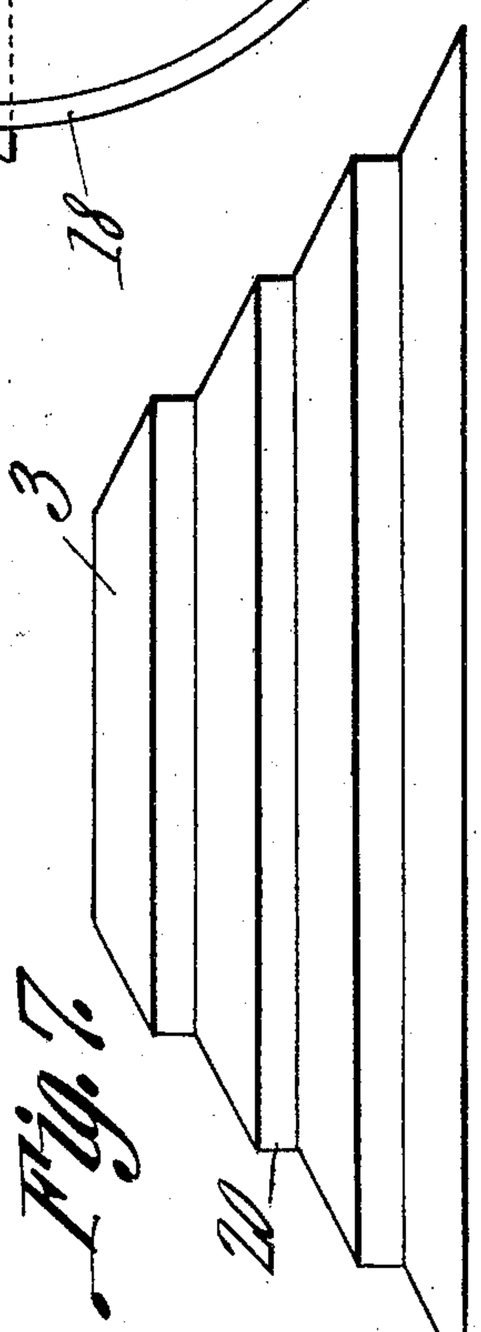


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

CLARENCE WALTER HONABACH, OF EDWARDSVILLE, PENNSYLVANIA.

COAL AND SLATE SEPARATOR.

983,283. Specification of Letters Patent. Patented Feb. 7, 1911.

Application filed April 16, 1910. Serial No. 555,769.

To all whom it may concern:

Be it known that I, CLARENCE W. HONABACH, a citizen of the United States, residing at Edwardsville, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Coal and Slate Separator, of which the following is a specification.

This invention relates to a coal and slate separator and it consists in the novel construction and arrangement of its parts as hereinafter shown and described.

The object of the invention is to provide an apparatus adapted to be used in the manner indicated which in its mode of operation effects the separation by reason of the fact that coal will glide or slide at a greater rate of speed down a metallic incline than slate and the apparatus effects the separation by including an incline which is maintained in a state of rotation while the two materials are gliding or sliding over the same and thus one material adheres to the said incline for a longer period of time than the other. That is to say the coal will fall more directly down along the incline while the slate has a tendency to stick to the same and consequently requires a greater length of time to pass over the said incline. Again under other conditions means is provided for retarding the gliding or sliding movement of the material. For instance, if the materials are extremely damp and their specific gravities are increased means should be provided for preventing them from passing too rapidly over the incline and this may be accomplished by a retarding air blast or by retarding plates as will be explained.

A further object of the invention is to provide means for effectually feeding the material to the said incline, and said means may be in the form of a plunger, mounted for reciprocation and even rotation if desired or in lieu of a plunger a series of approximately radially disposed feeding arms may be provided above a rotating table.

A further object of the invention is to provide means for promptly recovering the prime quality of coal and rendering it impossible for fine lumps of coal with particles or quantities of slate adhering thereto from mixing with the higher grade. This is accomplished by mechanism which will be described in detail hereinafter.

In the accompanying drawings;—Figure 1 is a vertical sectional view of the apparatus showing one form of feeding mechanism and one form of material retarding means. Fig. 2 is a sectional view of a modified form of feeding mechanism and adjacent parts. Fig. 3 is a plan view of a coal-receiving table showing a series of gates located over the same in one position. Fig. 4 is a plan view of the said table showing the gates in another position. Fig. 5 is a plan view of the inclined material separating table with parts broken away showing a series of pivoted dividing bars located over the same and means for adjusting said bars. Fig. 6 is a detail top plan view of a modified means for retarding the material upon the inclined table. Fig. 7 is a diagrammatic view of a modified form of separating table with projections thereof omitted. Fig. 8 is a modified form of still another feeding mechanism. Fig. 9 is a top plan view of the form of feeding mechanism shown in Fig. 8. Fig. 10 is a vertical sectional view of a portion of the inclined table and the dividing bars operating means.

As illustrated in Fig. 1 of the drawings the apparatus includes a frame 1 in which is journaled a vertically disposed shaft 2 and the said shaft may be made up of sections if desired. Any suitable means may be provided for rotating the said shaft 2. The inclined or conical table 3 is fixed to the shaft 2 and rotates with the same. A plane or flat feeding table 4 is located above the inclined table 3 and may rotate with the said table as indicated in the drawing, or means may be provided for rotating the table 4 in the opposite direction from that in which the table 3 rotates if such is desired. A feed pipe or pipe section 5 is located above the table 4 and is designed to remain stationary while the said table rotates and approximately radially disposed arms 6 are attached to the lower end of the pipe 5 and are located immediately above the upper surface of the table 4. The inclined table 3 is preferably made of sheet metal and as illustrated in Fig. 1 the said table is provided with a series of upwardly bent sections 7 which are cut from the material forming the body portion of the said table and are bent upward at an angle to the general inclination of the upper surface of said table. As a material retarding means an air pipe 8 is employed and the said pipe surrounds the table 3 and is provided at intervals with a series of nozzles 9 which are radially disposed toward the

outer surface of the table 3. Any means may be provided for forcing air through the pipe 8 and when the said air is discharged through the nozzle 9 it passes in blasts directly against the outer surface of the table 3 and the material that is passing over the same. The frame 1 is provided with a series of rollers or runners 10 and an annular table 11 is arranged to travel upon the said rollers. A series of arms 12 are fixed at their inner ends to a hub 13 which loosely receives the shaft 2 and the outer ends of the arms 12 are connected by means of links 14 with the pointed ends of pivoted gates 15. The gates 15 lie over the upper surface of the table 11 at proper intervals apart and are pivoted at their outer ends beyond the outer edge of the said table 11. Any suitable means may be provided for rotating the table 11 and the said table is designed to rotate toward the pointed end of the gates 15. The table 11 is in a horizontal plane and its inner edge is below the lower edge of the inclined table 13. The arm 12 projects through the opening provided between the adjacent edges of the said tables. A return chute 16 is located below the inner edge of the table 11 and is approximately concave in configuration. The parts above described may be duplicated or continued with the exception of the feeding device to any extent upon the shaft 2 below the uppermost inclined table 3. The operation of this form of the invention may be briefly stated as follows. The tables 3, 4 and 11 are rotated as indicated and the mixed material, coal and slate, are admitted through the chute or pipe 5 upon the upper surface of the table 4. As the said table 4 rotates the material comes in contact with the arms 6 and is gradually worked out to the periphery of the table 4 and over the edge of the same. As the material falls upon the upper surface of the table 3, and the said table is in rotation the lumps of slate will have a tendency to adhere to the upper surface of the said table, while the lumps of coal are free to slide, roll or slip over the upper surface of the table 3. As the slate is held back some extent and the coal is free the coal will make a quicker descent and will roll down directly upon the upper surface of the table 11 jumping over the space between the lower edge of the table 3 at the inner edge of the said table 11. When the coal thus deposited upon the upper surface of the table 10 comes in contact with the pointed gate 15, should the said material come in contact with the outer side portions of the said gates it will be brushed off over the outer edge of the table 11 but should it come in contact with the inner side of any one of the gates 15 it will be brushed off of the inner edge of the table 11 as the said table rotates toward the gates. Thus it will be seen that the higher grades of coal will fall directly upon the table 11 and will pass over at the outer edge of the same and may be collected or passed to a storage bin. The coal which does not descend along the upper surface of the table 3 so promptly as the higher grades will fall upon the inner edge of the table 11 and will be brushed off by the inner side portions of the gate 15 into the chute 16 and may be treated or passed over a lower table 3, as indicated in Fig. 1 of the drawings. In the mean time the lumps of slate which have passed at a slower rate down the inclined upper surface of the table 3 will not have gained sufficient momentum to jump over the space between the lower edge of the table 3 and the inner edge of the table 11 and consequently the said slate will fall down into the chute 16 and is mixed with the inferior grade of coal above mentioned. This mixed material is passed to a lower table 3 and subjected to a second process of separation. The projections 7 at the upper surface of the table 3 will have a tendency to prevent the material from descending along the upper surface of the table too rapidly and will also facilitate the separation of the coal from the slate. If the material should be in a damp condition and for this reason the slate should be slippery or have a tendency to slip too quickly down the table 3 a blast of air may be discharged against the material through the nozzles 9 of the pipe 8 and thus the material in addition to being dried to a proper condition will be retarded in its descent along the upper surface of the table 3. The blasts of air will retard the descent of the coal as well as the slate but by reason of the fact that the coal is globular and the slate is flat the slate will cling to the table while the coal will roll down over the same and thus the separation is effected.

As illustrated in Fig. 2 of the drawing a modified form of feeding device is employed. In this form the table 4 and the arms 6 are dispensed with and in lieu thereof a plunger 17 having a conical upper end and is slidably mounted in a cylinder 18. Means is provided for reciprocating the plunger 17 and the material is dumped directly upon the upper end of the said plunger. When the plunger is down in the cylinder the material is collected in the upper portion of the cylinder and from the plunger is elevated so that its upper end is flush with the upper edge of the cylinder the material is forced out over the table 3.

As illustrated in Fig. 6 of the drawing corrugated retarding plates 19 are pivotally or otherwise attached to the outer ends of the arms 6 and lie over the upper inner portion of the table 3. When the material

comes in contact with the said retarding plates 19 it is held back to a certain extent and is divided into fine streams by the corrugation of the said plate and thus the process of separation upon the table 3 is facilitated.

As illustrated in Fig. 7 of the drawings the table 3 may be provided along its upper surface with a series of flights 20 if such are desired.

As illustrated in Figs. 8 and 9 of the drawing a feeding device is provided which is maintained in a state of rotation and which is provided at its outer edge with a series of spirally disposed sections 21. As the material is deposited upon the upper surface of the feeding device and falls upon the spirally disposed sections 21 and the said devices rotated (by any suitable means) the material is forced from the feeding device by the elevated portions of the said sections 21 out over the inner edge of the inclined table 3.

As illustrated in Fig. 5 of the drawing a series of dividing arms or bars 22 are pivoted at their inner ends to the outer ends of the arms 6 and the said bars 22 lie down over the upper surface of the table 3. The lower ends of the bars 22 project beyond the outer edge of the table 3 and are pivotally connected to arms 23 which in turn are connected at their inner ends with a common hub 24 which loosely receives the shaft 2. Thus it will be seen that when the hub 24 is turned or any one of the arms 23 is swung about the axis of the shaft 2 that all of the bars 22 will be adjusted simultaneously over the upper surface of the table 3 and thus the said bars may be caused to assume any desired angle with respect to the arms 23. The pivotal connections between the several parts are sufficiently loose to permit of the desired amount of adjustment of the bars 22. When the bars 22 are employed they prevent the material which comes from between two adjacent arms 6 from mixing with the material which comes from between any of the other adjacent arms 6. That is to say the material which comes from the feeding device between any two adjacent arms 6 must continue between the adjacent bars 22 pivoted to the said arms and pass down over the surface of the table 3. These bars 22 will be found necessary sometimes for the reason that the slate may have a tendency to stick too tenaciously to the table 3 and in this case would become mixed with the coal which comes from between the next adjacent bars 6.

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

1. A separator comprising an annular conical table mounted for rotation, means for feeding mixed material to the upper surface of the same, and an air blast means for retarding the passage of the material over the same.

2. A separator comprising an annular conical table mounted for rotation, means for feeding mixed material to the upper surface of the same and an air blast means having discharge nozzles radially disposed with relation to the table and adapted to retard the passage of the material over the same.

3. A separator comprising an annular conical table mounted for rotation and having at its upper surface outwardly disposed projections, means for feeding mixed material to the upper surface of the same, and an air blast means having discharge nozzles radially disposed with relation to the table and having their discharge ends directed toward said projections, said nozzles being adapted to retard the passage of material over the table.

4. A separator comprising an annular conical table mounted for rotation, means for feeding mixed coal and slate to the same, an annular table spaced from and located below the lower edge of the conical table, and a gate located upon the last said table, and means for rotating the last said table.

5. A separator comprising an annular conical table mounted for rotation, means for feeding mixed coal and slate to the same, an annular table spaced from and located below the lower edge of the conical table, means for rotating the last said table, and a pointed gate located over the last said table.

6. A separator comprising an annular conical table mounted for rotation, means for feeding mixed coal and slate to the same, an annular table spaced from and located below the lower edge of the conical table, a series of pivoted gates located above the last said table, means for rotating the last said table, and means for adjusting said gates upon their pivots.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CLARENCE WALTER HONABACH.

Witnesses:
JAMES PRICE,
S. PAUKSETR.