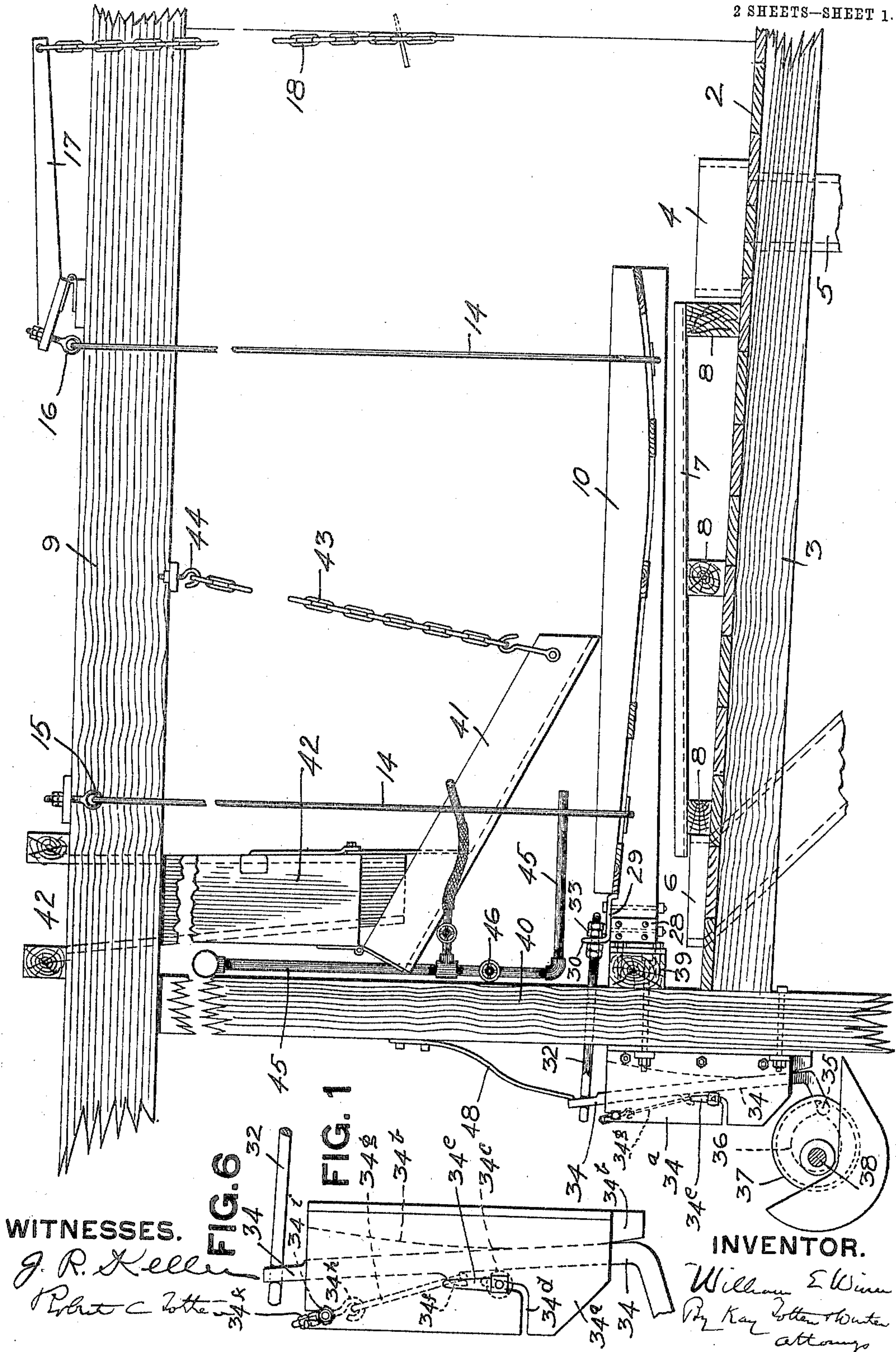


No. 811,608.

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APPLICATION FILED FEB. 18, 1905.

2 SHEETS—SHEET 1.

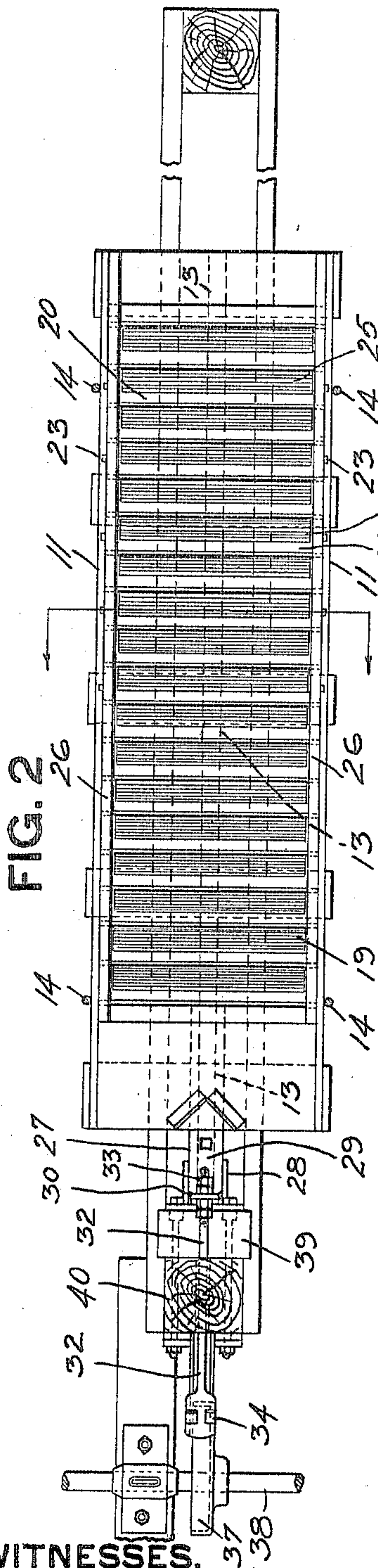


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2 SHEETS—SHEET 2.



WITNESSES.

*J. R. Keller*  
*Robert C. Totten*

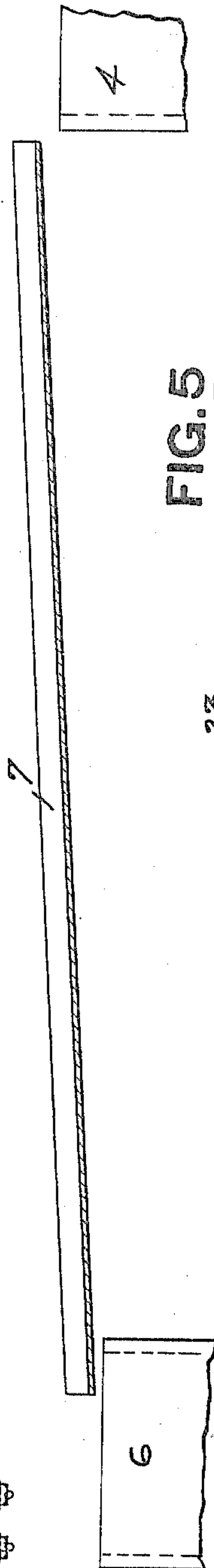
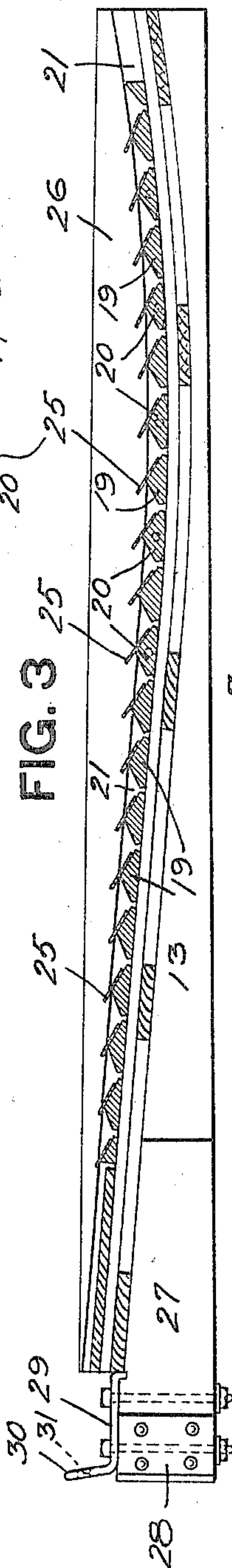


FIG. 5

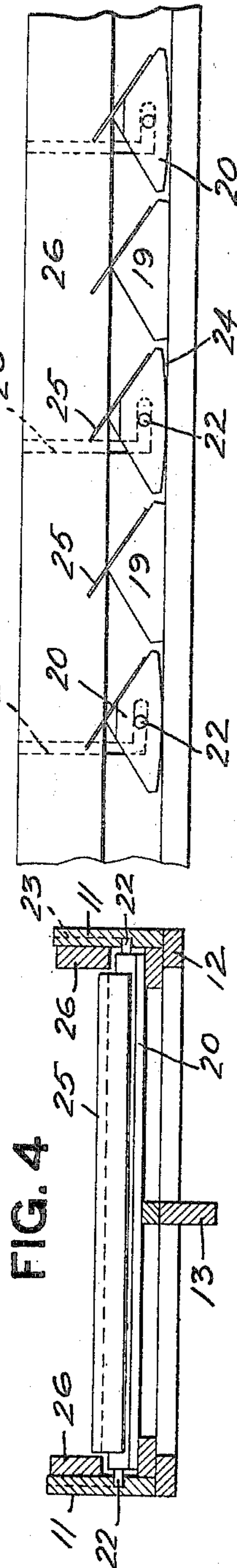


FIG. 4

INVENTOR.

*William E. Winn*  
*By Roy Totten & Winters*  
*attorneys*



# UNITED STATES PATENT OFFICE.

WILLIAM E. WINN, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO HEYL & PATTERSON INC., OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## COAL AND LIKE WASHER.

No. 811,608.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed February 18, 1905. Serial No. 246,283.

*To all whom it may concern:*

Be it known that I, WILLIAM E. WINN, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Coal and Like Washers; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to coal and like washers, its object being to provide a washer in which there shall be under all conditions a rapid and thorough separation of the foreign matters or impurities—such as slate, pyrites, bone-coal, fire-clay, &c.—which it is essential to wash out of coal to be used for coking purposes.

To these ends my invention comprises, generally stated, a suitable pan or receptacle to receive the coal and water, with means for jolting or jarring said pan, and riffles forming the bottom of said pan, with intervening spaces, a portion of said riffles being loose, so as to be free to oscillate with the movement of the pan.

My invention further comprises a washer having a single bottom formed of riffles adapted to retain the water and at the same time allow of the escape of the finer impurities.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of my improved washer. Fig. 2 is an enlarged plan view. Fig. 3 is an enlarged longitudinal section. Fig. 4 is a cross-section. Fig. 5 is an end view of a number of the riffles, showing the manner in which the movable riffles are mounted; and Fig. 6 is an enlarged detail view.

Like numerals indicate like parts in each of the figures.

In the drawings the numeral 2 designates a suitable platform supported by the joists or beams 3. Supported by the platform 2 at the tail end is the hopper 4 to receive the washed coal, said hopper being connected by the chute 5 with a suitable receptacle below. Located at the opposite end of the platform is the chute 6, which directs the refuse to a suitable receptacle below. Intermediate of the hopper 4 and chute 6 is the trough 7, supported upon the beams 8 at a slight incline,

so as to direct the refuse received therein into the chute 6.

Suspended from the beam 9 is the table or pan 10, said pan being made up of the side pieces 11. Supported upon the bottom frame 12 is the keel 13. Connected to the bottom frame 12 are the rods 14, with hooked ends engaging said frame, by means of which the pan 10 is suspended, the upper ends of said rods being connected to the eyebolts 15 16, the eyebolt 16 being connected to the hinged lever 17, whereby the incline of the pan 10 may be varied as may be desired, according as the materials to be washed may vary. A chain 18 is connected to the lever 17, and by means of said chain said lever may be operated.

The bottom of the pan 10 is made up of the stationary riffles 19 and the movable riffles 20. These riffles are supported within grooves 21 in the side pieces 11 of the pan, said groove being so shaped as to form a reservoir in said pan of varying depth. The movable riffles are preferably employed at or adjacent to the deepest part of the pan or at what may be termed the "zone of fine impurities," for the purpose fully hereinafter set forth. These loose riffles 20 alternate at this section of the pan with the fixed or stationary riffles, and said movable riffles are provided at their ends with the pins or studs 22, which are adapted to enter the bayonet-groove 23, whereby a bayonet-joint connection is formed between said movable riffles and the sides 11 of the pan. By this construction the riffles may be readily removed, and when once seated they have sufficient play in the horizontal portion of the bayonet-groove to give the proper action in working. The bottoms of the movable riffles 20 may be slightly rounded, as at 24, in order to impart likewise a slight rocking movement to the riffles when they are oscillated. The riffles are formed substantially triangular in section, and upon one of their angular faces is secured the shield or protector 25, formed of suitable metal, so as to relieve the wear upon the riffles, which are usually constructed of wood. The riffles are spaced a slight distance apart, and owing to their triangular form between each riffle is formed a substantially V-shaped receptacle to receive the finer impurities. Strips 26 are secured to the inside of the side pieces 11 of



the pan to further strengthen the pan and prevent the upward movement of the loose riffles.

The head 27 of the keel 13 is provided with the strengthening-plates 28, which are bolted to said keel, and to the upper side of said head-block is secured the flanged plate 29. The flange 30 has the opening 31 therein, through which passes the rod 32, said rod being secured to the flange 30 by means of the nuts 33. The opposite end of the rod 32 is engaged by the lever 34. This lever 34 at its opposite end has the roller 35, which engages the groove 36 in the eccentric 37, mounted on the shaft 38. The lever 34 is confined between the guide-plates 34<sup>a</sup>, secured to the post 40. One face of said lever bears against the curved block 34<sup>b</sup> and the other against the stop 34<sup>c</sup>. This stop is adapted to be adjusted at different points in the slots 34<sup>d</sup> in the plates 34<sup>a</sup>. The stop 34<sup>c</sup> is released by the arm 34<sup>e</sup> when it is to be moved. The fulcrum-point of lever 34 is thus made variable. A hook 34<sup>f</sup> on the lever 34 is connected by the link 34<sup>g</sup> with the eyebolt 34<sup>h</sup>. This bolt passes through the pipe 34<sup>i</sup> and is provided with the adjusting-nuts 34<sup>k</sup>. By this construction an oscillating movement is imparted to the rod 32, which is imparted therefrom to the pan 10. The bumper 39 is bolted to the upright beam 40 to receive the shock of the head-block 28.

Suspended above the pan 10 is the chute 41, hinged to the hopper 42, a chain 43, connected to the forward end of the hopper 42, the other end of said chain being connected to the hook 44 in the beam 9. The coal or other material to be washed is brought in cars or other receptacles and discharged into the hopper 42, whence it passes by the chute 41 into the pan. The water is at the same time introduced into the pan by means of the pipe 45, which is connected up with a suitable supply and controlled by valves 46. Secured to the upright beam 40 is the spring 48, whose free end bears against the lever 34. This spring when compressed by oscillation of the pan acts to assist in the return of the pan toward the bumper and overcomes the dead-point in the rotation of the eccentric.

When my improved washer is in use, the crushed coal, with all its impurities—such as slate, pyrites, bone-coal, and fire-clay—is discharged from the chute 41 into the pan 10, a suitable quantity of water being supplied by the pipe 45. An oscillating movement is then imparted to the pan 10 by means of the connection of the rod 32 with the eccentric 37, and as said pan swings back and forth it is jarred or jolted each time the head 27 comes in contact with the bumper 39, which acts to disturb and shake up the contents of the pan. As in all washers of this character, in which the separation of the impurities is obtained through the jarring action and by

flotation, the lighter materials, or the pure coal, will be carried on the top and will by the action of the water be carried to the rear or tail end of the pan, escaping over the end thereof into the washed-coal hopper 4. When the machine is in operation with its bulk of coal and water, the reciprocating motion of the table, together with the percussion, causes the separation of the coal and impurities into two principal layers. The top layer or clean coal is discharged by flotation at the tail, the lower layer containing the fine impurities, which collect in the V-shaped spaces between the riffles, while intermediate thereof is the large dense stuff, which by the bumping action is carried to the forward end of the pan and discharged therefrom into refuse-chute 6. The fine impurities, as stated, fill up the spaces between the riffles, and it will be found that ordinarily the zone of fine impurities will be substantially within the range indicated by the location of the loose riffles, although, of course, this may vary according to the size of the pan, and there are no defined limits within which these loose riffles are to be located. As the pan reciprocates the loose riffles being free to move will beat against the solid riffles and keep up an agitation of the fine impurities, so that an uninterrupted flow of such fine impurities is sure and certain between the spaced riffles. The more rapidly the fine impurities can be carried through the spaced riffles the less danger there is of the stuff being carried over the tail end with the clean coal. The farther away from the tail end of the machine the less liability there is of the impurities of lesser density being carried to the tail end of the machine, and as a consequence there is not the necessity of extending the loose riffles to the forward end of the machine, although this may be done, if desired. The fine impurities as they pass through the spaces between the riffles are received by the trough 7 and carried by the water down into the refuse-chute 6. The riffles near the head of the table readily hold the large impurities of first-grade density, the intermediate riffles, or those at or near the middle of the table, hold the fine stuff of second-grade density, while the riffles at or near the tail end of the table hold the fine stuff of the third-grade density or generally a sulfurous coal. As the pockets are kept about full of the fine stuff, the travel of the large and first grade of impurities is over the riffles toward the head, being conveyed thereto by the bumping action, while the coal travels by flotation above the riffles toward the tail end, whence it is discharged into the washed-coal hopper. The reciprocating motion of the table keeps the bits of materials over the riffles thoroughly agitated, and the bumping action causes the solid bits of material to turn over and over in the water, so that a thorough separation takes place. By



the use of the loose riffles a less violent bumping action is necessary, as there will be no obstruction to prevent the free passage of fine impurities from the pockets of the pan, and the loose riffles will aid in breaking up any pack that may start to form in the riffle-pockets. If the material becomes packed within the pockets, so that it does not have opportunity to escape, then the coal will be carried with the larger particles of impurities toward the head and be discharged into the refuse-bin.

By my improved construction I am able to dispense with the use of a water-chamber just below the riffles, which has been found necessary in the constructions heretofore employed in order to effect the proper flotation of the lighter material. The construction of the bottom of my pan enables me to hold sufficient water to effect the proper flotation, while at the same time there is no back pressure of water from below to disturb the finer impurities, which collect between the riffles and act to mix them with the coal moving toward the tail of the washer.

What I claim is—

1. In a coal or like washer, the combination of a suitable pan having a riffled bottom,

a series of freely-movable riffles in said bottom, and means for oscillating and imparting a percussive action to said pan.

2. In a coal or like washer, the combination of a suitable pan having a riffled bottom, a series of loose riffles alternating with stationary riffles, and means for oscillating and imparting a percussive action to said pan.

3. In a coal or like washer, the combination of a suitable pan having a riffled bottom, a series of loose riffles alternating with stationary riffles within the zone of fine impurities, and means for oscillating and imparting a percussive action to said pan.

4. In a coal or like washer, the combination of a suitable pan having a single curved bottom formed of riffles parallel with each other and having openings between the same, said openings being sufficiently small to retain a body of water within said pan during the washing operation, and means for oscillating and imparting a percussive action to said pan.

In testimony whereof I, the said WILLIAM E. WINN, have hereunto set my hand.

WILLIAM E. WINN.

Witnesses:

ROBERT C. TOTTEN,  
G. KREMER.