D. CLARK.

Apparatus for Separating Coal from Slate, &c.

No. 217,064. Patented July 1, 1879.

Fig: 1.

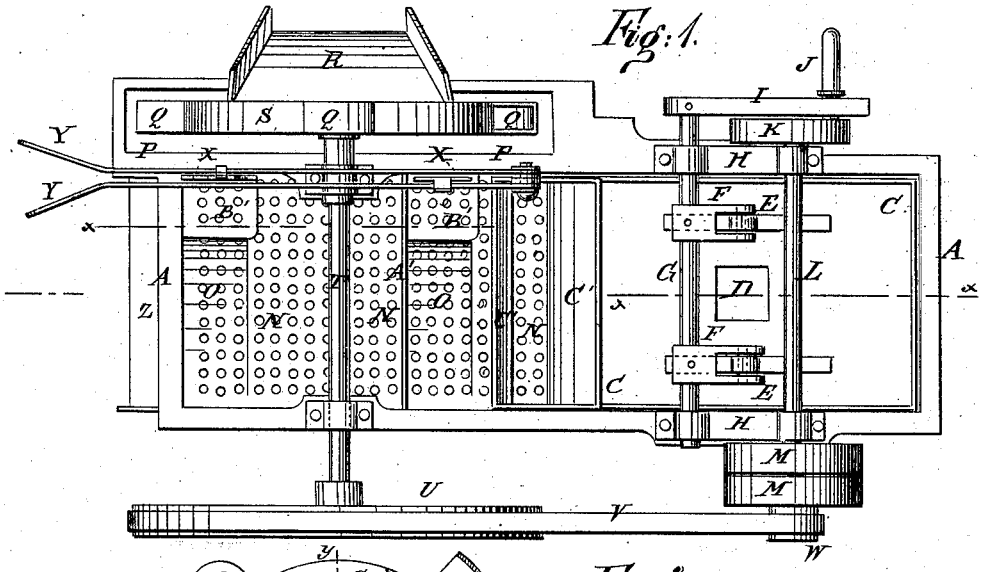


Fig: 2.

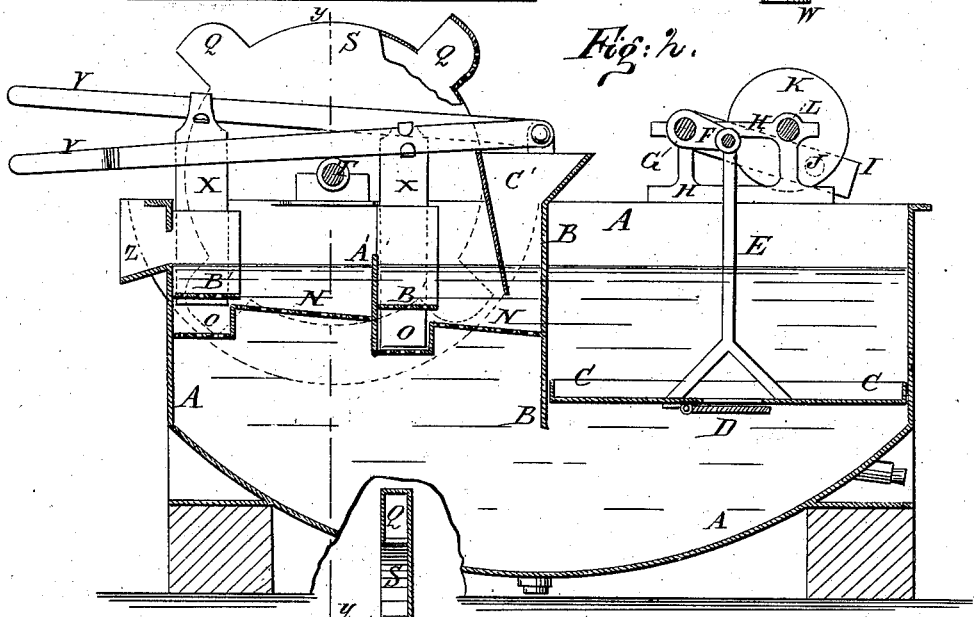
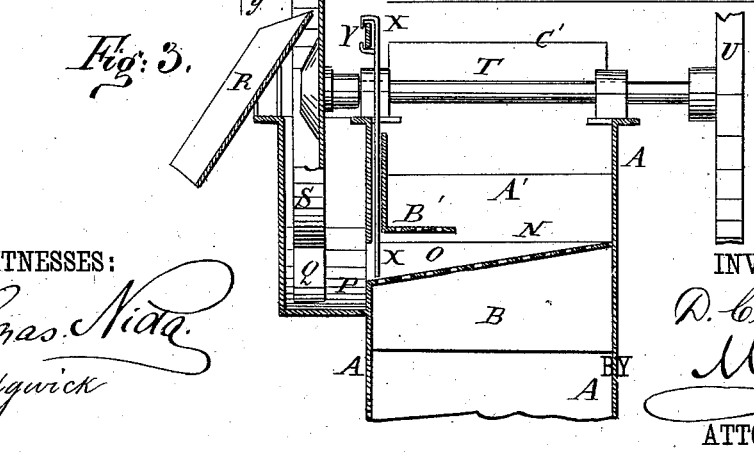


Fig: 3.



WITNESSES:

Chas. Nida.

C. Sedgwick

INVENTOR:

D. Clark

Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

DAVID CLARK, OF HAZLETON, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR SEPARATING COAL FROM SLATE, &c.

Specification forming part of Letters Patent No. **217,064**, dated July 1, 1879; application filed March 19, 1879.

To all whom it may concern:

Be it known that I, DAVID CLARK, of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Separating Coal from Slate, &c., of which the following is a specification.

Figure 1 is a top view of my improved apparatus. Fig. 2 is a longitudinal section of the same, taken through the broken line *x x x*, Fig. 1. Fig. 3 is a detail cross-section of the same, taken through the line *y y*, Fig. 2.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved apparatus for separating coal from slate, and for separating other substances of different specific gravities, and which shall be simple in construction, convenient in use, and effective and reliable in operation.

The invention consists in the combination of the perforated inclined chutes and the adjustable slides with the perforated stationary bottom and the tank; in the combination of the perforated bottom inclined upwardly from its division-wall to the end of the tank, and divided by vertical bridge-plate, the chutes, the perforated plates and slides operated by levers with the tank and the well; and in the combination of the piston provided with a valve, the perforated bottom inclined upwardly from the pendent wall to the end of the tank, the inclined perforated chutes, the perforated plates, the slides, the operating-levers, and the elevator-wheel with the tank, the well, and driving mechanism, as hereinafter fully described.

A represents the tank, which is made with vertical sides and ends, and a curved or semi-cylindrical bottom. The tank is divided into two compartments by a vertical partition, B, the lower edge of which does not extend to the bottom of the said tank A, sufficient space being left to allow the water to move back and forth freely.

C is a piston, which is made of such a size as to fit snugly into and work up and down freely in one of the compartments of the tank A. With this construction, as the piston C moves downward it forces the water into the other compartment, and as it moves upward it allows the said water to flow back and stand at the same level in both compartments. In the piston C is formed a valve, D, opening downward, which, as the said piston C moves upward, opens to prevent a vacuum from being formed below the said piston, and thus prevents the water from being drawn rapidly from the second into the first compartment.

The valve D should be so balanced as to remain shut when left free.

To the piston C are attached the lower ends of two piston-rods, E, the upper ends of which are hinged to two crank-arms, F, rigidly attached to the shaft G. The shaft G works in bearings in brackets H, attached to the upper edges of the sides of the tank A, or to other suitable supports.

To one end of the shaft G is rigidly attached a crank-arm, I, which is slotted longitudinally to receive a crank-pin, J, attached to the crank or crank-wheel K, attached to the end of the shaft L. The shaft L is placed parallel with the shaft G, revolves in bearings in the brackets H, and has pulleys M attached to it to receive the driving-belt.

The second compartment of the tank A is provided with a perforated partition or false bottom, N, which inclines upward slightly from the partition B to the end of the tank A. In the perforated bottom N are formed one, two, or more chutes, O, which are also perforated, and which incline downward toward openings in the side of the tank A, which openings open into the well P of an elevator for the escape of the slate or other heavier substance, and from which they are taken by the perforated buckets Q, and are discharged into a spout, R, through which they escape from the machine.

The buckets Q are formed upon or attached to the rim of a wheel, S, which is attached to the end of a shaft, T. The shaft T revolves in bearings attached to the upper edges of the sides of the tank A, or to other suitable supports, and to its other end is attached a large pulley, U, to receive a belt, V. The belt V also passes around a small pulley, W, attached to the end of the drive-shaft L.

The outlet-openings at the lower end or ends of the chute or chutes O are opened and closed, as desired, by sliding gates X, which slide in

sockets attached to the side of the tank A, and their upper ends are attached to the levers Y, pivoted to supports attached to the said tank. The coal or lighter material passes out through an opening in the upper part of the end of the tank A, and passes off through the spout Z.

To the perforated bottom N, at the farther side of each perforated chute O, except the last one, is attached a vertical plate, A′, to serve as a bridge-wall to stop the lower strata of slate, and compel them to pass out through the said chutes.

To the side of the tank A, over the discharge-opening of each chute, is attached a horizontal or slightly-inclined perforated plate, B′, to prevent the coal or lighter material from sliding down along the side of the tank A and passing out with the slate when the said outlets are opened.

The coal and slate or other lighter and heavier materials are introduced into the inner part of the second compartment of the tank A through the hopper C′, which extends below the surface of the water and nearly to the perforated bottom N, so that the coal and slate will be put upon the bottom, and the coal will rise through the slate, instead of the slate having to sink through the coal, making the separation quicker. This construction also causes the coal to be fed to the separator automatically, and no faster than the separated coal and slate pass from the machine, making the operation of the machine uniform.

The forward side of the hopper C′ may be made adjustable, so that by raising and lowering the said side the coal may be fed to the machine faster or slower, as may be desired.

In using the apparatus, as the piston C descends each time it forces the water beneath it into the second compartment, and up through the coal and slate, and raising them. As the piston C rises the water follows it into the first compartment, allowing the coal and slate to sink back. In this movement the slate, being the heavier, will rise slower and to a less distance, and will sink quicker, so that finally the coal will be at the top and the slate at the bottom. As the tank fills up, the coal passes out through the spout Z, and the slate through the chutes O.

If coal passes out with the slate, the slides X should be lowered to check the escape of the slate, and if slate passes out with the coal the slides X should be raised to allow the slate to escape more rapidly. In this way the separation can be fully controlled.

In places where water is scarce the machine may be provided with a second tank to receive the outflowing water, and with a pump to force it back into the tank A, so that the said water may be used again and again.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the perforated inclined chutes O and the adjustable slides X with the perforated stationary bottom N and the tank A, substantially as herein shown and described.

2. The combination of the perforated bottom N, inclined upwardly from its division-wall B to the end of the tank, and divided by the vertical or bridge plate A′, the chutes O, the perforated plates B′, and slides X, operated by the levers Y with the tank A and the well P, substantially as and for the purpose set forth.

3. The combination of the piston C, provided with the valve D, the perforated bottom N, inclined upward from the pendent wall to the end of the tank, the inclined perforated chutes O, perforated plates B, the slides X, operating-levers Y, and the elevator-wheel S with the tank A, the well P, and the driving mechanism, substantially as and for the purpose set forth.

DAVID CLARK.

Witnesses:
JAMES T. GRAHAM,
C. SEDGWICK.