

(No Model.)

C. W. ZIEGLER.

MACHINE FOR SEPARATING IMPURITIES FROM COAL.

No. 277,530.

Patented May 15, 1883.

Fig. 1.

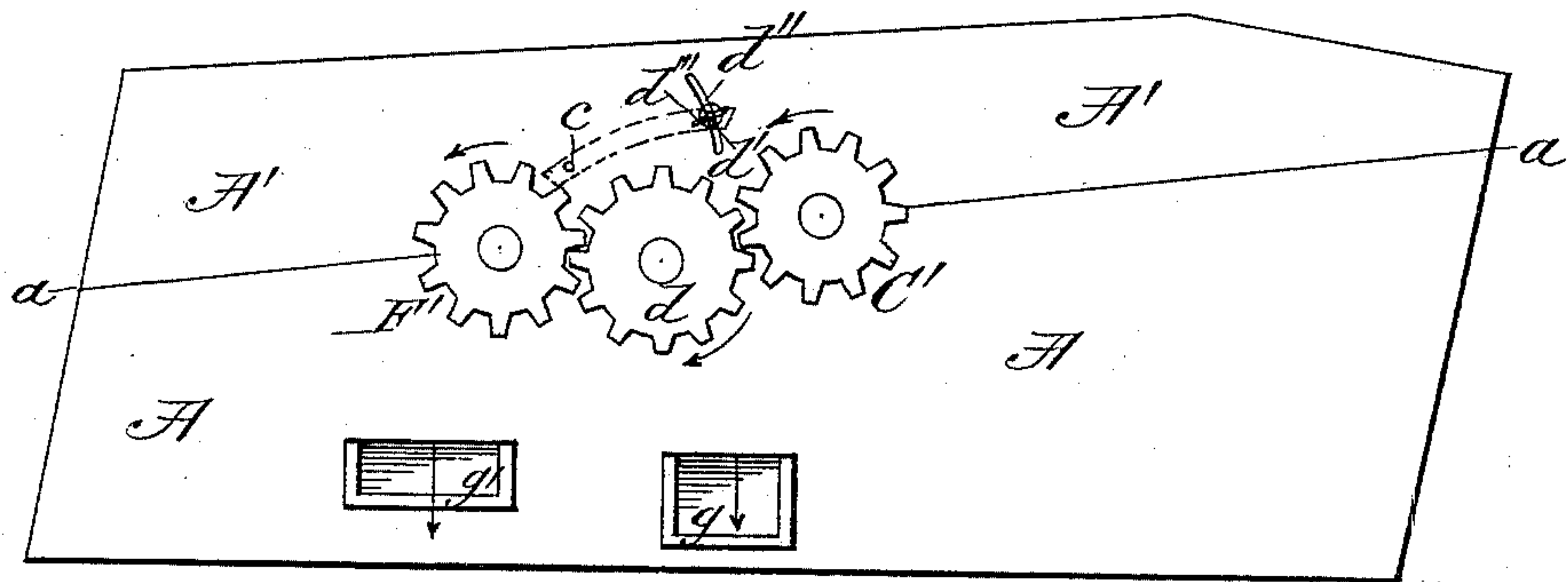


Fig. 3.

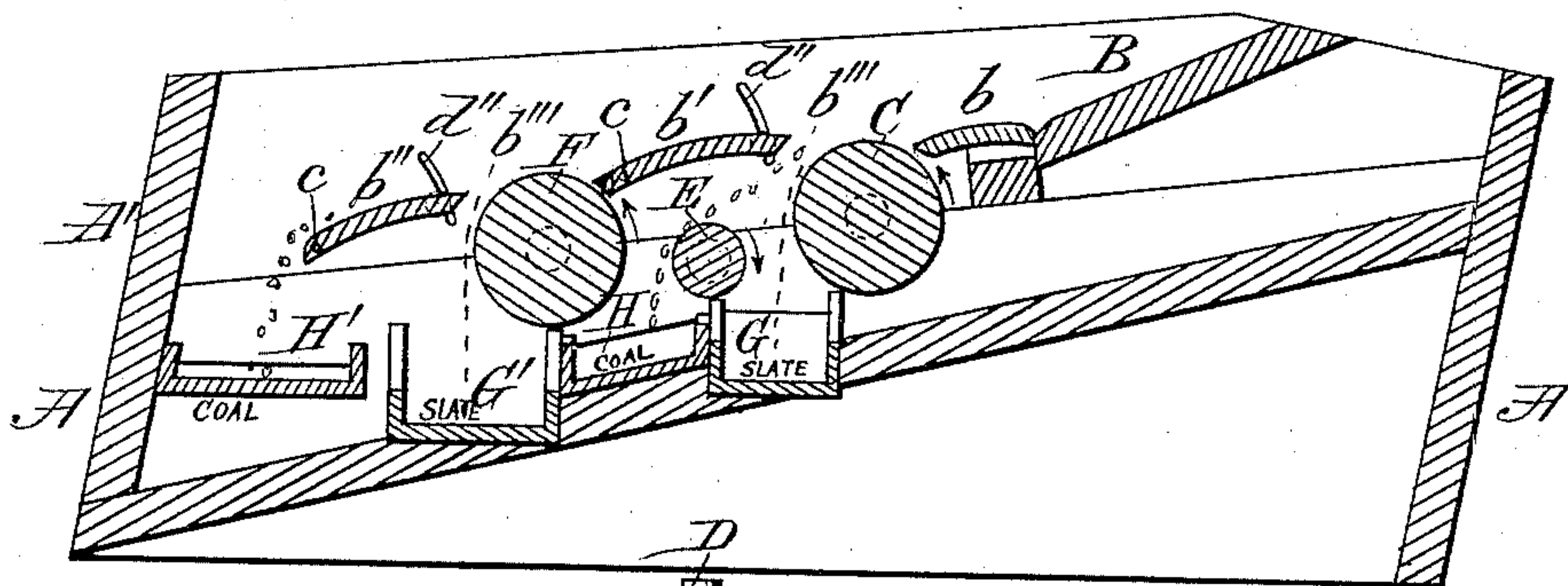
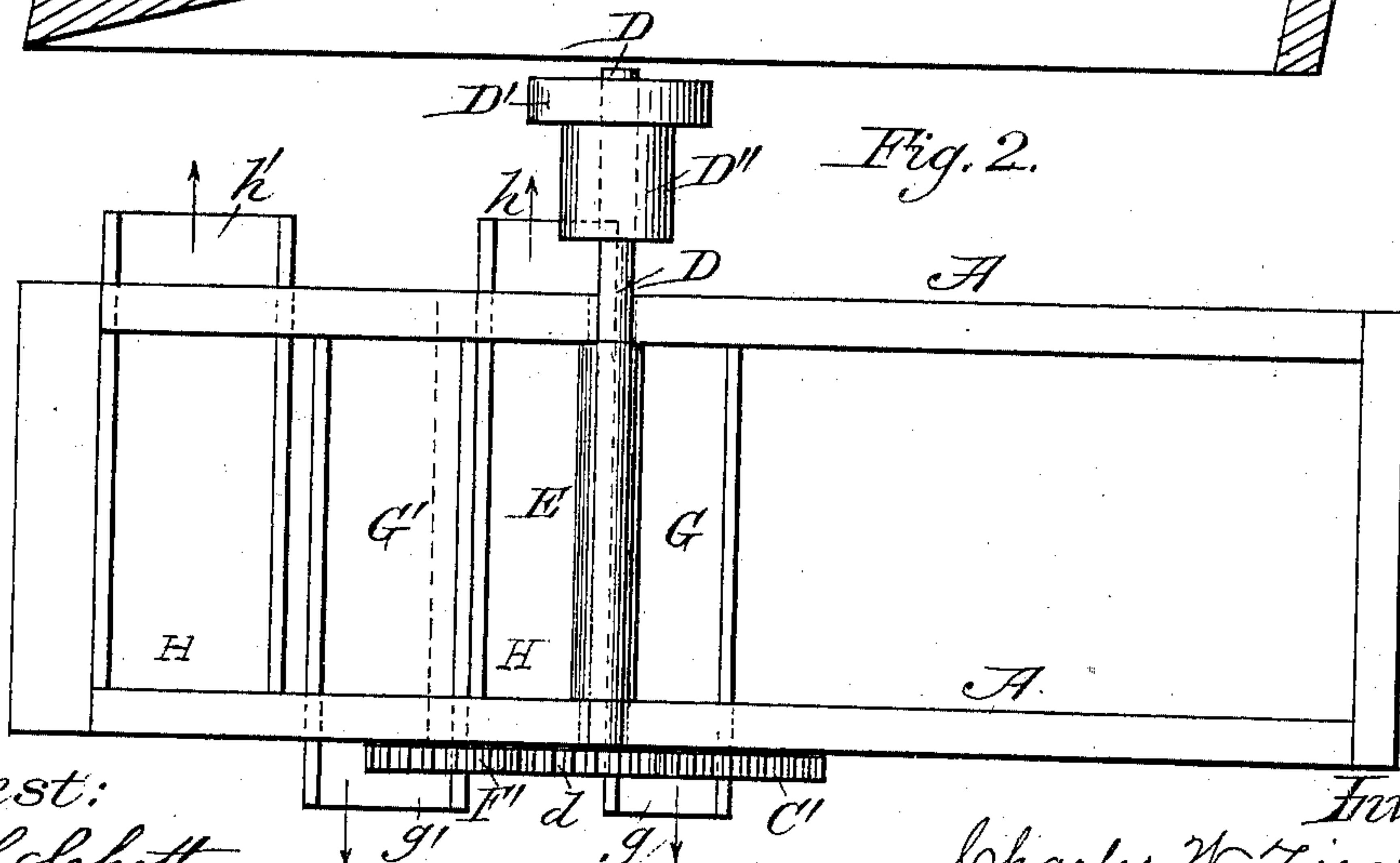


Fig. 2.



Attest:

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MACHINE FOR SEPARATING IMPURITIES FROM COAL.

SPECIFICATION forming part of Letters Patent No. 277,530, dated May 15, 1883.

Application filed February 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. ZIEGLER, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Separating Impurities from Coal; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The object of this invention is to separate slate and other impurities from coal after the coal has been sized by the ordinary screening process, where the slate and other impurities have passed together through the screen; and it consists in the construction of the parts and their combinations, which together form the improvements in the machine, as will be fully hereinafter described.

In the drawings, Figure 1 represents a side view of the machine. Fig. 2 represents a top view of part A, and Fig. 3 represents a longitudinal sectional view of the machine.

A and A' represent the body of the machine, which is in two separate parts, separated at line *a*, Fig. 1, the part A being the lower and supporting part, and part A' being removable therefrom at pleasure.

B is an incline within the sides of the removable or upper part, A', of the machine, and is placed directly under the delivery of the coal from the screen, or so as to receive the coal and the impurities upon its inclined surface. This inclined plane forms a chute to direct the coal and slate into the separating parts of the machine, and it may be made adjustable, so as to have more or less inclination, as the different kinds of coal as to hardness might require, in order to give sufficient momentum to the coal to force it and the slate with other impurities upon and over the curved top of apron *b* to the revolving roller C.

D is a transverse shaft, revolving in proper bearings in the supporting part A of the machine, and is put in motion by a pulley, D', or by a smaller one, D'', according to the speed it may be desired to revolve it, in the direc-

tion shown by the arrows, as seen in Figs. 1 and 3.

E is a small roller, around shaft D, of a length to freely revolve within the width of the frame or body A.

F is another revolving roller, like C, revolving in proper bearings in body A.

d is a toothed gear-wheel on shaft D, and revolves with it and gears into toothed wheel C' on the end of shaft of roller C on one side and on the opposite side gears into wheel F', on the shaft of roller F, causing the rollers C and F to revolve in the direction from the incline B, while the roller E revolves in the opposite direction.

b' and *b''* are aprons, more or less curved upon their top surfaces, and each is so arranged that the edge that is toward the entering coal and impurities—such as slate—can be adjusted, or raised or lowered, with relation to the roller before it, to increase or decrease the opening *b'''* between the upper edge of the apron and the adjacent roller that is forward of the apron, and also to raise the adjustable edge to be higher than the roller over which the coal and slate must pass to strike the apron. For adjusting the aprons I prefer to pivot the rear edges in the frame or body A', as seen in Fig. 3 at *c*, and have screw-pins *d'*, attached near the forward edges, and at the ends thereof to go through concentric slots *d''* in the sides of the frame A', holding-nuts *d'''* being turned onto screw-pins *d'* to hold the edges of the aprons firmly in their adjusted position. When the coal contains but little slate the aprons may be stationary or non-adjustable.

G and G' are inclined chutes to receive the slate and other impurities that are separated from the coal, such slate and impurities passing out of the machine at *g* and *g'*. H H' are other chutes, inclined in the opposite direction to the inclination of chutes G G', and receive the purified coal and deliver it out of the machine at spouts *h h'*.

It will be observed that the rollers C and F are journaled in bearings that are on an inclined line between parts A and A'—that is, the roller C is higher than the roller F—for the purpose of keeping up the momentum of the passing coal over the aprons to the next roller

F. There may be any number of these rollers and intermediate aprons as may be found necessary for the kind of coal and slate or other impurities to be separated. Very hard coal, 5 with a small proportion of slate therewith, can be reasonably well separated from the slate by passing over one roller, and two rollers and aprons will perfect the separation generally. With soft coal and a larger proportion of slate 10 it may be necessary to add more rollers and aprons, and consequently more delivery-chutes; but this will depend wholly upon the kind of coal and impurities to be separated.

A machine thus constructed and placed in 15 a proper position to receive the broken coal, slate, and other impurities as they fall from the revolving or other screen upon the inclined slide B, gives to the coal the proper momentum, according to the size of the coal to be 20 separated, to pass over the first curved apron, *b*, which is a half-inch (more or less) below the top of roller C, which revolves in the direction of the inflowing current of coal and slate, causing all the passing material to strike and 25 be carried over the roller C. Slate, being of greater density than coal and its surfaces flat, will naturally seek and get the lowest place in or beneath the coal, and, being different in form or shape from the coal, it slides upon the 30 apron *b* and strikes the revolving roller C, and is carried over it and precipitated through the opening *b'''*, between the roller C and raised edge of the curved apron *b'*, when it falls perpendicularly into the inclined chute G, with 35 the small particles of other impurities, as seen in Fig. 3. The coal, having a different form, will roll over and strike the roller C, and be carried over it and over the raised edge of apron *b'*, and if any small coal has passed 40 through the opening *b'''*, it, having greater momentum than the slate, goes over the lower and central roller, E, and is precipitated into chute H, to pass out of the machine at *h*. If the coal after going through one separation is 45 not freed from its slate and impurities, it is carried over a second or a third series of such separating devices until it is free from slate, when it is delivered from the last of the curved aprons into chute H', and thence out of the 50 machine at *h'*, while the lesser slate and other impurities not separated before fall into chute G' through opening *b'''*, thence out at spout *g'*.

The delivery-spouts *g* and *g'* may empty their slate and impurities into a conveyer-case to be delivered wherever desired, and the clean coal 55 from spouts *h* and *h'* may also be dropped into conveyer to be conveyed to some convenient place to be transported from the separator.

I lay no claim to revolving rollers alone for separating slate from coal, nor do I claim, 60 broadly, inclines to give momentum to the coal in passing into the machine, or rods held in spring-arms in front of the rollers, as shown in Patent No. 163,298; but,

Having thus described my invention, what I 65 do claim, and desire to secure by Letters Patent, is—

1. In a machine for separating coal from slate, the combination of the chute B, curved apron *b*, revolving rollers C, E, and F, and 70 aprons *b'* and *b''*, the said rollers and aprons being arranged to form openings *b'''* between them, with the inclined chutes G, G', H, and H', substantially as and for the purposes described.

2. In a machine for separating coal from 75 slate, the combination of the curved aprons *b* and *b'* and the revolving roller C, with the chutes G and H, as and for the purposes described.

3. In a machine for separating coal from 80 slate, the combination of the curved adjustable aprons *b'* and *b''*, rollers C, E, and F, openings *b'''* between them, and inclined chutes G, H, G', and H', as and for the purposes described.

4. In machines for separating coal from 85 slate, the combination of the pivoted and curved apron *b'*, constructed to be positively adjusted perpendicularly, the screw-pins *d'* and holding-nuts *d''*, substantially as and for the purposes described. 90

5. A machine for separating coal from slate, composed of two parts, the lower part, A, containing the rollers E, F, and C, and chutes G, G', H, and H', and the upper or removable 95 part, A', containing the chute B, fixed curved apron *b*, and the adjustable aprons *b'* and *b''*, as described.

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

CHARLES W. ZIEGLER.

Witnesses:

NEWTON CRAWFORD,
F. M. GREEN.