

H. BRADFORD.

Improvement in Machine for Separating Coal and Slate.

No. 132,623.

Patented Oct. 29, 1872.

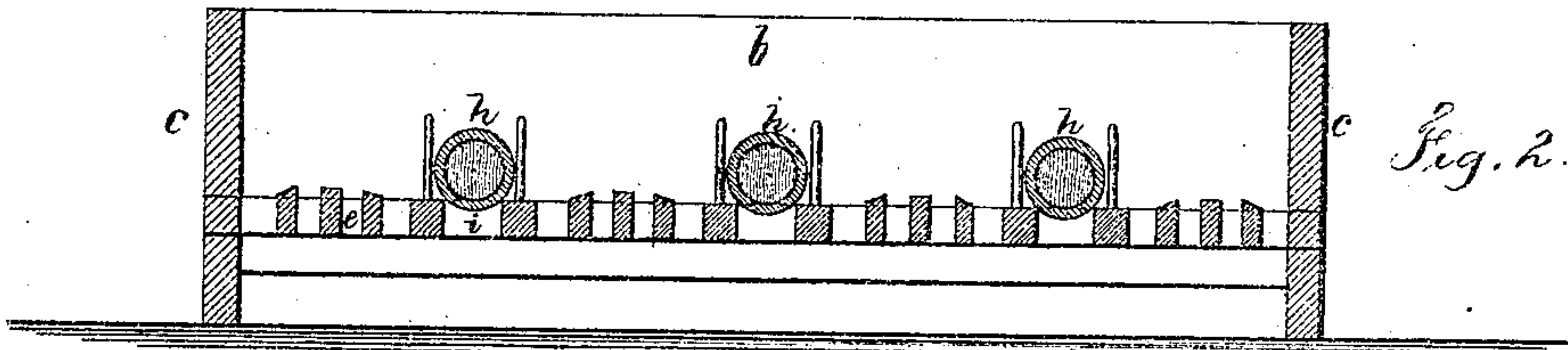


Fig. 2.

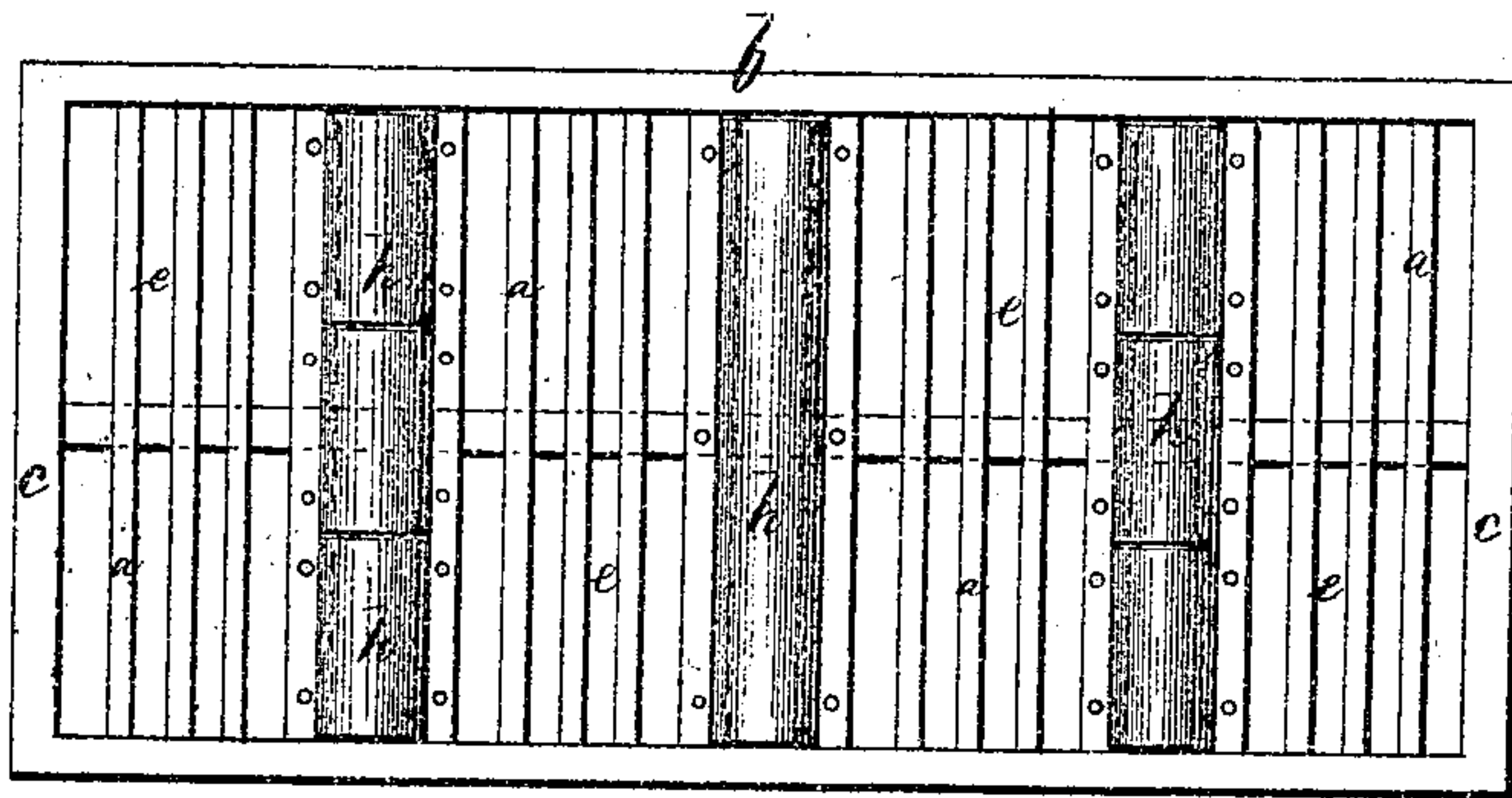


Fig. 1.

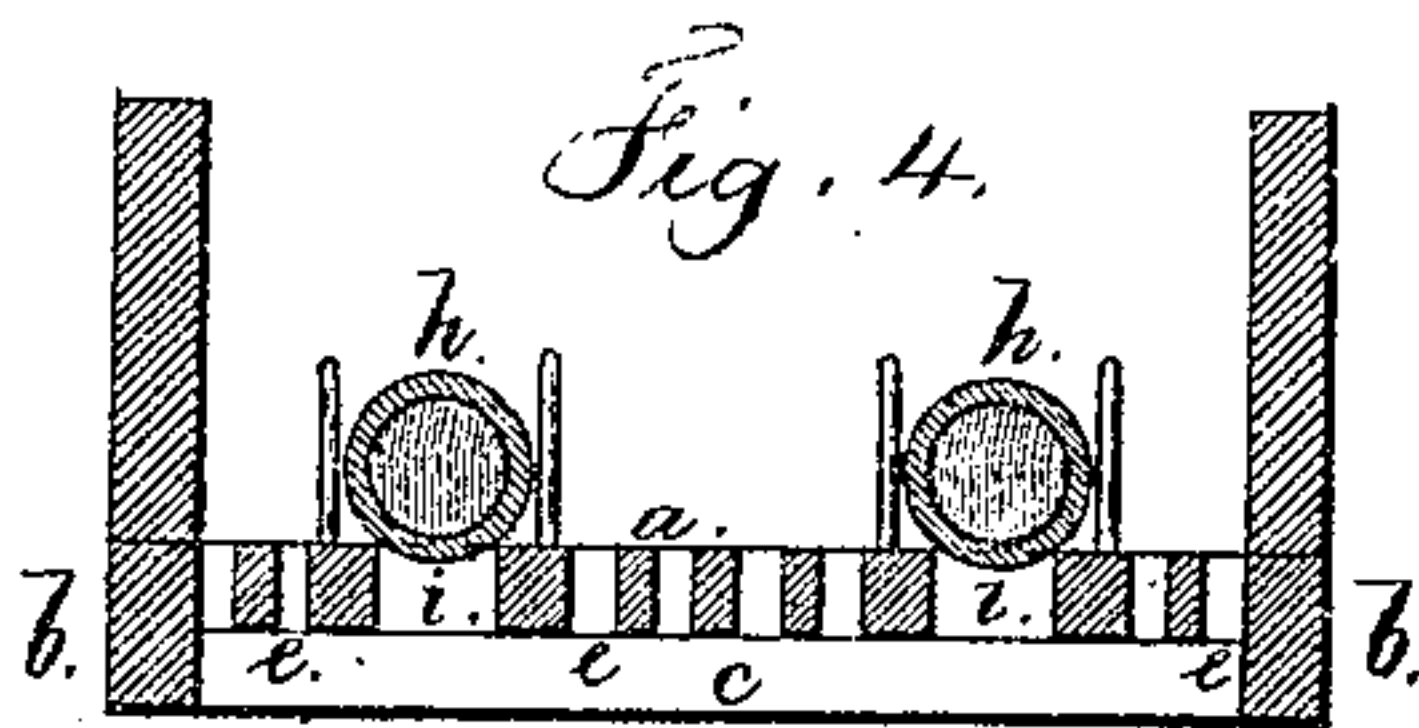


Fig. 4.

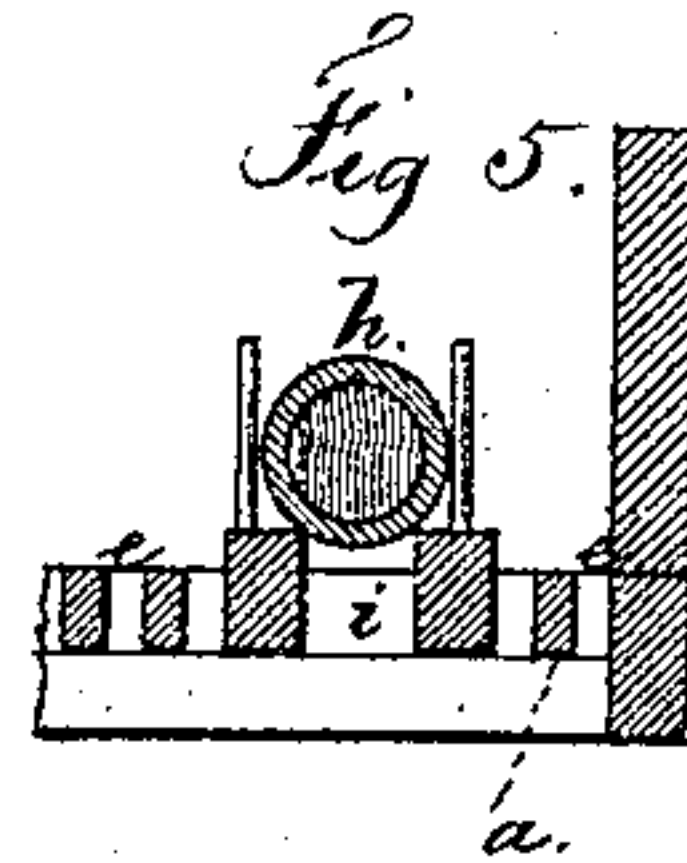
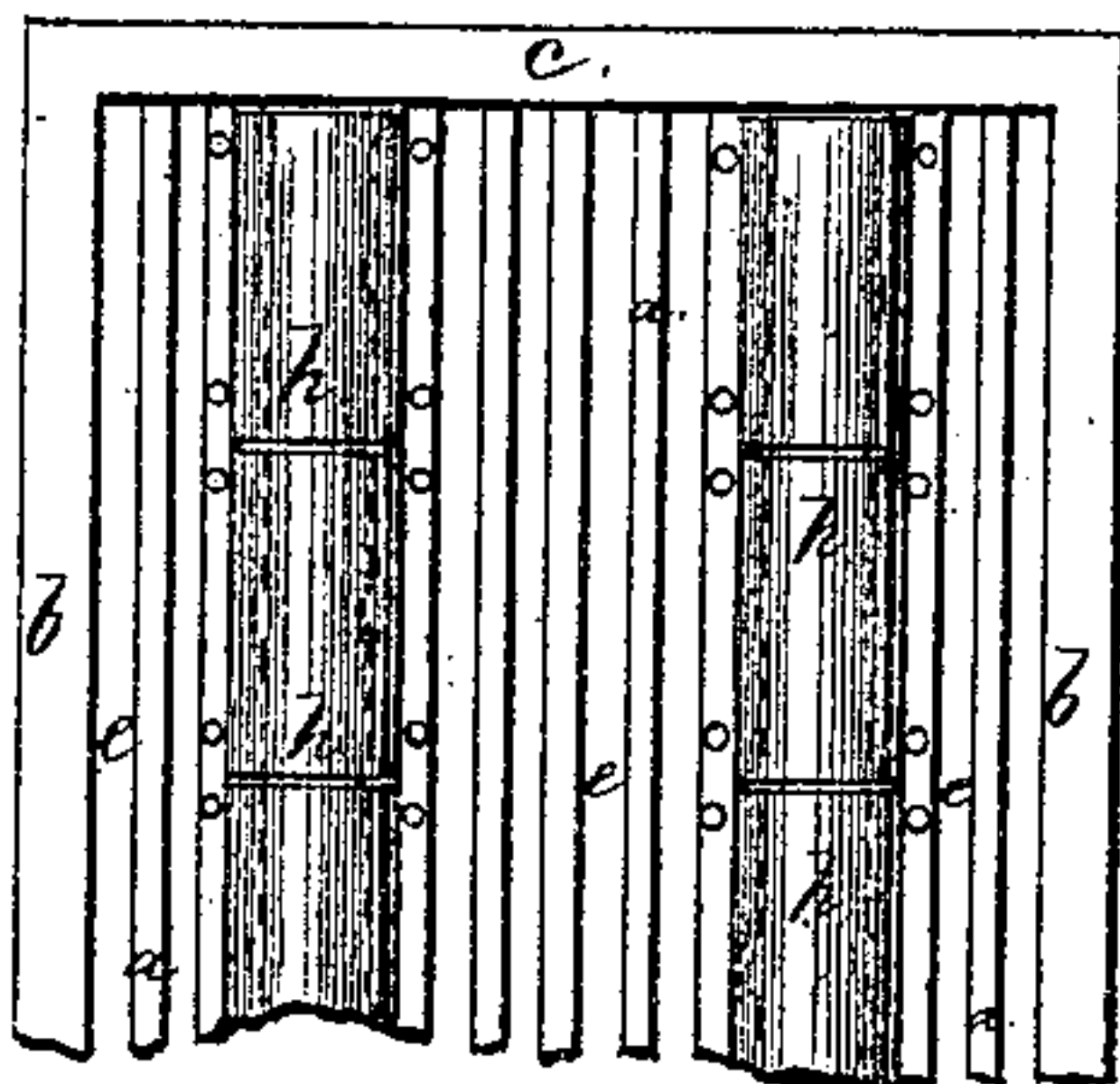


Fig. 5.

Fig. 3.



Witnesses,

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UNITED STATES PATENT OFFICE.

HEZEKIAH BRADFORD, OF READING, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR SEPARATING COAL AND SLATE.

Specification forming part of Letters Patent No. **132,623**, dated October 29, 1872.

To all whom it may concern:

Be it known that I, HEZEKIAH BRADFORD, of Reading, in the county of Berks and State of Pennsylvania, have invented an Improvement in Separators for Removing Slate from Coal, and separating substances of different specific gravities; and the following is declared to be a correct description thereof.

This invention is for a slotted grate-bottom for a jig-box, and for suitable artificial valves to suit said improved bottom. I have heretofore employed a bottom for a jig-box with holes, over which have been placed artificial valves, round, spheroidal, or of various shapes, several layers thick, which have arranged themselves and acted, so that when immersed in water, by a jiggling motion, they would partially close the holes in the jig-bottom on the upward stroke and fall through the water on the downward stroke, producing a pumping operation, causing an upward current of water in the jig-box sufficient to cause the slate to be separated from the coal, the slate, by reason of its greater gravity, falling through the upward current, while the coal, being of lighter gravity, would be kept on the surface of the jig-box and be delivered over the front of the box. This worked very well while the pieces of slate and coal were of about the same size or shape, but when pieces of slate pass through the colliery-screens, as they frequently do, of a length fifty to one hundred per cent. greater than the diameter of the holes of the colliery-screen, these long pieces of slate, although they would find their way through the artificial valves, many of them would lie on the top of the jig-bottom under the valves without being able to pass through. To obviate this difficulty, and to dispense with some of the valves heretofore necessary, I make the jig-bottom of slotted openings running lengthwise or widthwise of the jig-bottom. There are several rows of these slotted openings, wide enough to permit the slate to pass through, the long pieces passing sidewise, while the intermediate slotted openings are so narrow that the slate will accumulate on the intermediate space, and act as valves for that intermediate space, while the surplus slate will slide into and pass through the slotted openings, and these should be so made that the upward current of water, while the jig is in motion, shall be of the same or nearly the same

speed in every portion of the box, and to effect this the grate-bars at the sides of the wide openings should be wider than the bars between the narrow openings. The small pieces of slate will have a chance to go through the smaller openings, while the larger and longer slate will, as it accumulates, and while acting as valves, gradually slide to the larger openings and pass through them, the upward current preventing the coal from touching the jig-bottom. If the slate accumulates too much on the jig-bottom, then the narrow grate-bars can be made slightly highest midway between the widest openings, and the height of the other bars arranged so as to make a regular descent of the slate to the wider openings, where it will pass through the jig-bottom at the wider opening provided with valves, which I prefer to be long hollow valves, kept in their places by pins or guides. These valves are to be of a specific gravity a little greater than the coal, but not as great specific gravity as the heaviest of the slate. The motion of the jig will then cause them to raise just enough to allow the surplus slate to pass through these large openings, while they will close at each stroke quick enough to prevent any coal passing through. These valves can be made of hollow metal pipe, plugged at each end, and their gravity can be increased, as they are worn away, by asphaltum, resin, or any substance that will adhere to the inside and can be equally distributed. If the slate does not accumulate enough on the bottom to make a sufficient thickness of valves, then the bars between the wider openings can be depressed enough to hold sufficient slate to form the proper thickness of valves, or the bars at the sides of the wider openings can be raised enough to effect the same object, and bars of metal can be fastened to these wider bars and raised or lowered to suit different substances to be separated, or the bars themselves may be adjustable. The slotted bottom also may be made with uniform openings, of suitable width to let the slate pass through, on which can be used layers of valves—preferably the short valves of hollow metal pipe, plugged at each end about the same length as diameter, or they may be round, or of any other convenient shape—of the proper specific gravity, and sufficiently numerous to cause a proper separation of the

slate from the coal. In this way long pieces of slate, after passing through the valves, will make their way through the slotted grate side-wise more readily than through the jig-bottoms with round, square, or polygonal holes.

In the drawing, Figure 1 is a plan, and Fig. 2 is a vertical section transversely of the bars; and Fig. 3 is a plan of a portion of the bottom with the bars running lengthwise of the separator; Fig. 4 is a section of the same; and Fig. 5 is a similar section, with the bars adjacent to the valves the highest.

The jig is made of a box of suitable size or material, and of a character adapted to the material to be operated upon. The mechanism for giving this a vertical or jiggling motion in the water does not form part of this invention, but I remark that the extent of movement is to be adapted to the work to be performed. The metallic bars *a a* are of the desired size and shape. It is preferable that they should be widest at the top. These bars may run lengthwise of the jiggling-box *b c*, as seen in Fig. 3, or transversely, as seen in Fig. 1, and they are to be sustained in place by bolting them to the jiggling-box *b c*, or in any other convenient manner. The spaces between the bars *a a* are not wide enough to allow any material to pass that it is desired to retain. In separating coal, the spaces will depend upon the size of the coal, and the spaces *e e* will be smaller than the coal in cases where the bars are not at a uniform distance apart. At intervals a wider space, *i*, is left between the bars, said space being wider than the pieces of coal; but these spaces are protected by valves, so that only the heavy material will pass through when exposed to the jiggling operation aforesaid. The bars *a* may be all upon the same level, as in Fig. 4, or some of the intermediate ones between the openings *i i* may

be slightly the highest, to throw the pieces of material toward those openings *i*, as in Fig. 5, or the bars adjacent to the openings may be the highest to retain the slate, as aforesaid.

The valves employed are to be of the proper size, shape, and gravity, according to the work to be done. I have shown the said valves as tubular, and of varying lengths. In some instances they may pass across the jiggling-box, or they may be more numerous and of shorter lengths, as shown in Fig. 3. These cylindrical valves may be of any material of suitable hardness and gravity. These valves *h* may be filled or partially filled with any suitable material, or plugged at the ends, and as the metal wears away, the tube may be filled so as to obtain the desired gravity. The vertical guide-pins serve to keep the valves over the slots or openings *i i*, between the bars. If all the spaces between the bars are of uniform widths, the entire jig-bottom is to be covered with layers of valves, as hereinbefore described.

I claim as my invention—

1. The separator-bottom, made of metallic bars with intervening openings, substantially as set forth.
2. The separator-bottom, made of metal bars, with valves above the wider openings, between the bars, substantially as specified.
3. The tubular valves for the bottom of the separator, substantially as set forth.
4. The cylindrical valves applied to and combined with the jig-bottom and guides, substantially as set forth.

Signed by me this 20th day of January, A. D. 1872.

HEZEKIAH BRADFORD.

Witnesses:

GEO. T. PINCKNEY,
GEO. D. WALKER.