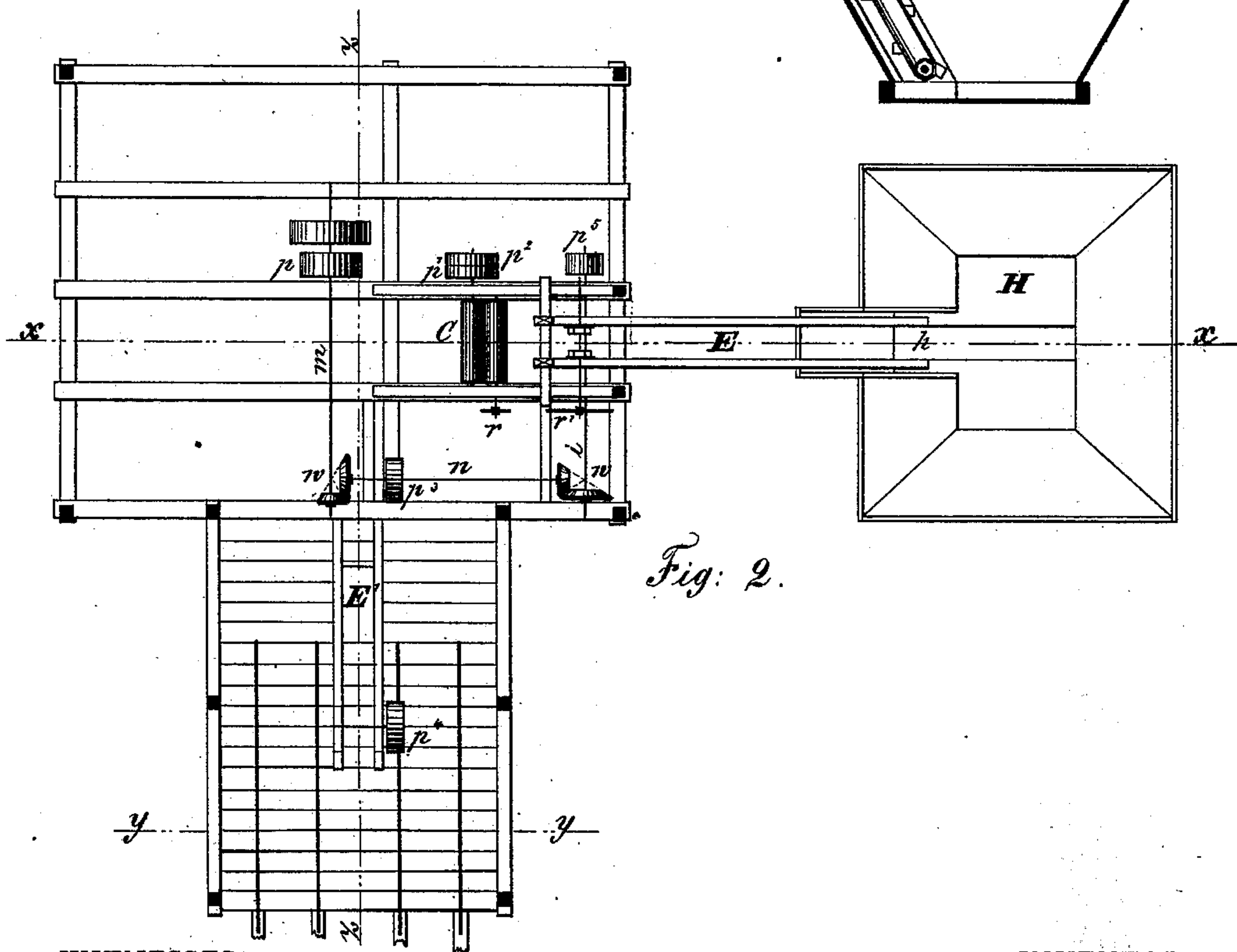
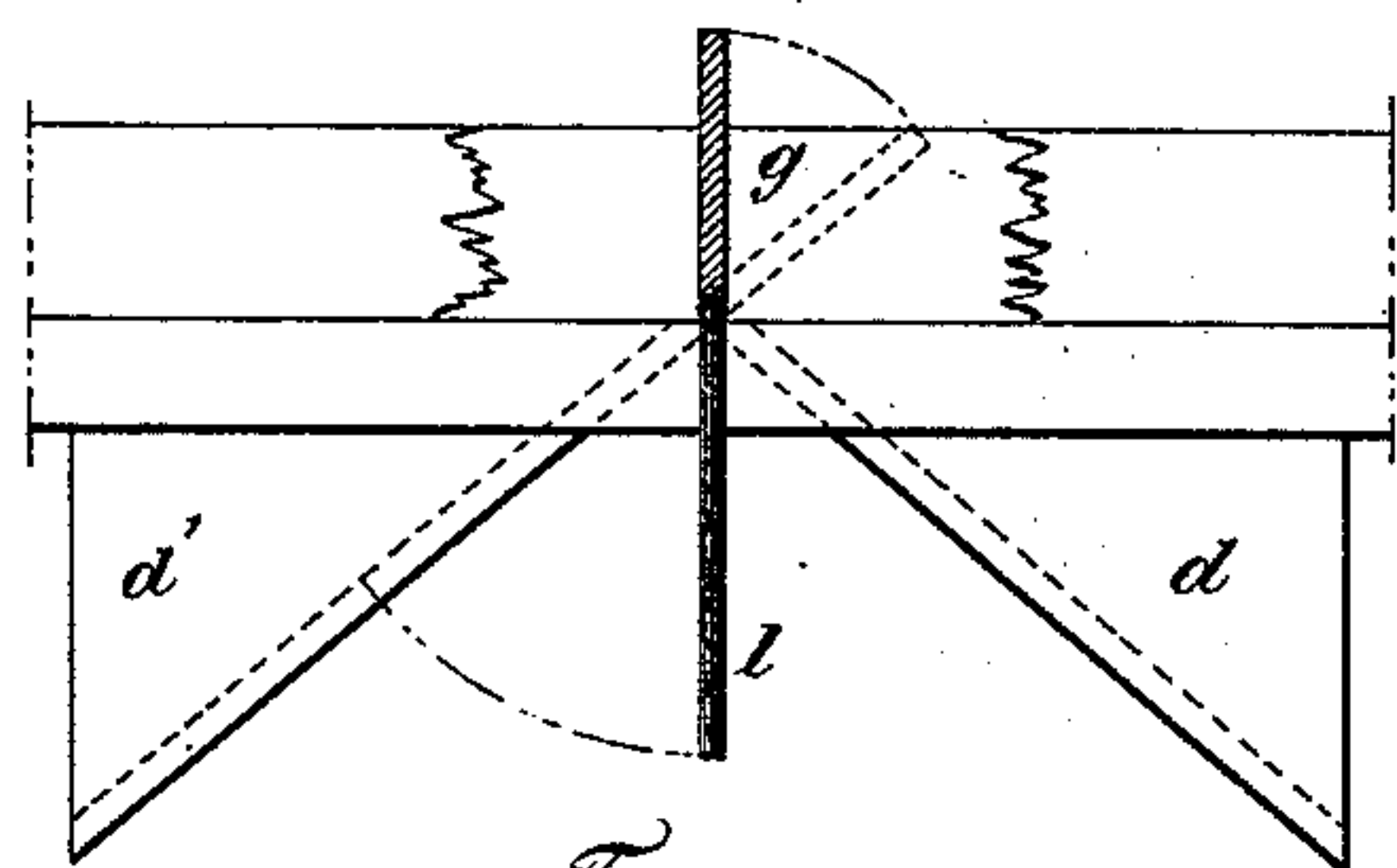
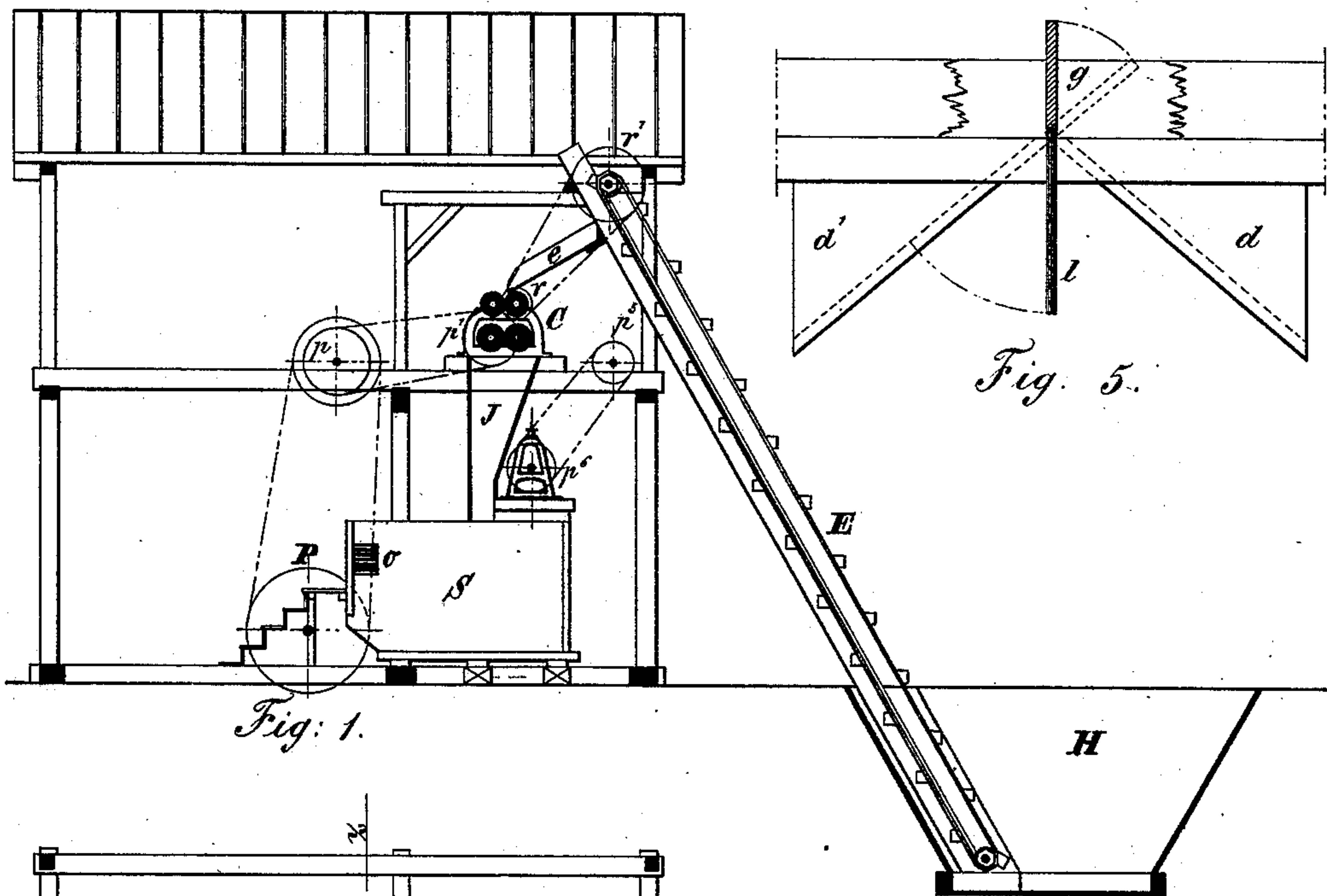


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Process and Apparatus for Washing Bituminous Coal.  
No. 215,181. Patented May 6, 1879.



WITNESSES:

Chas. M. MacLean  
Jas. H. Brown,

INVENTOR

Sebastian Stutz

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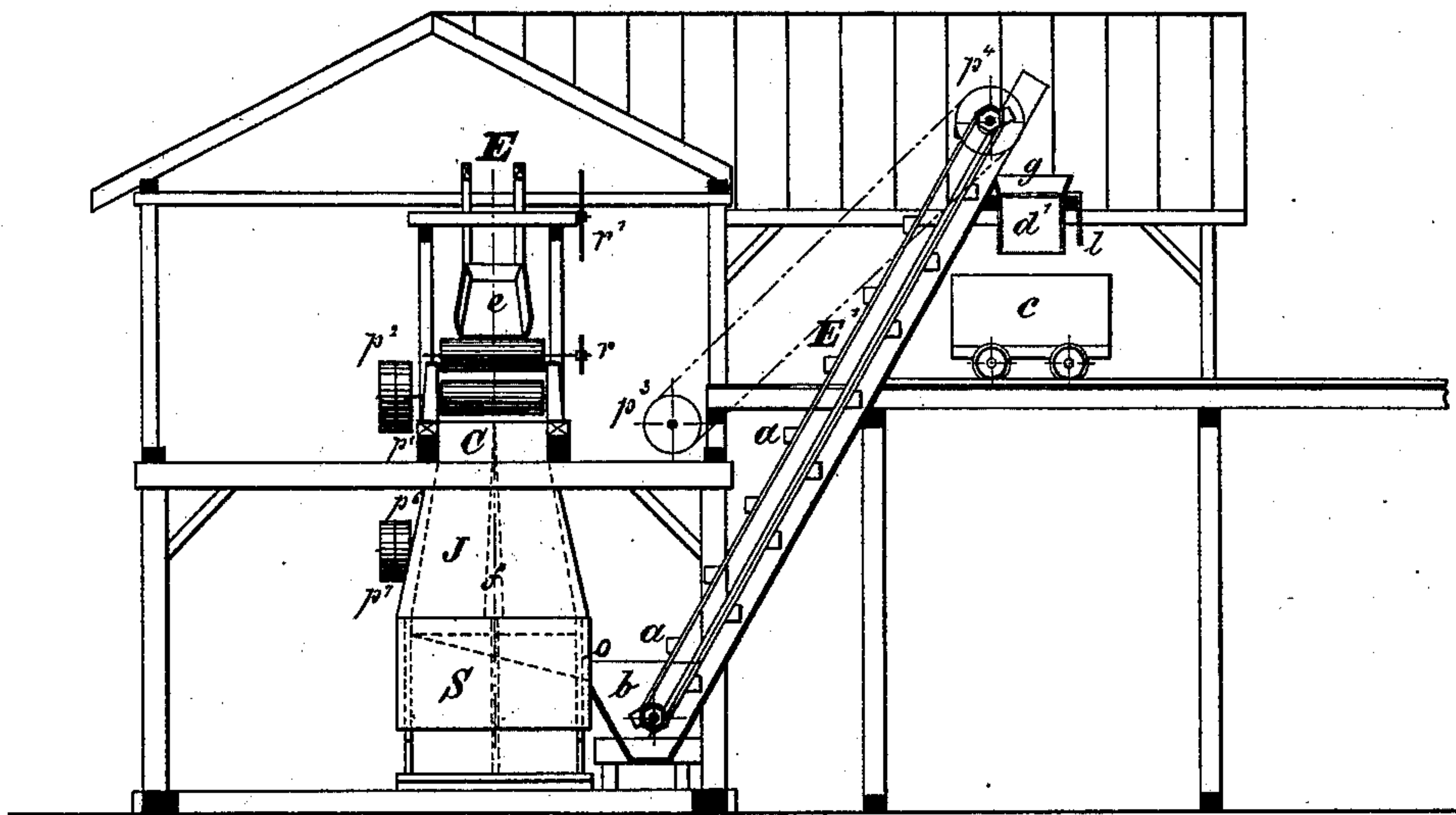


Fig. 3.

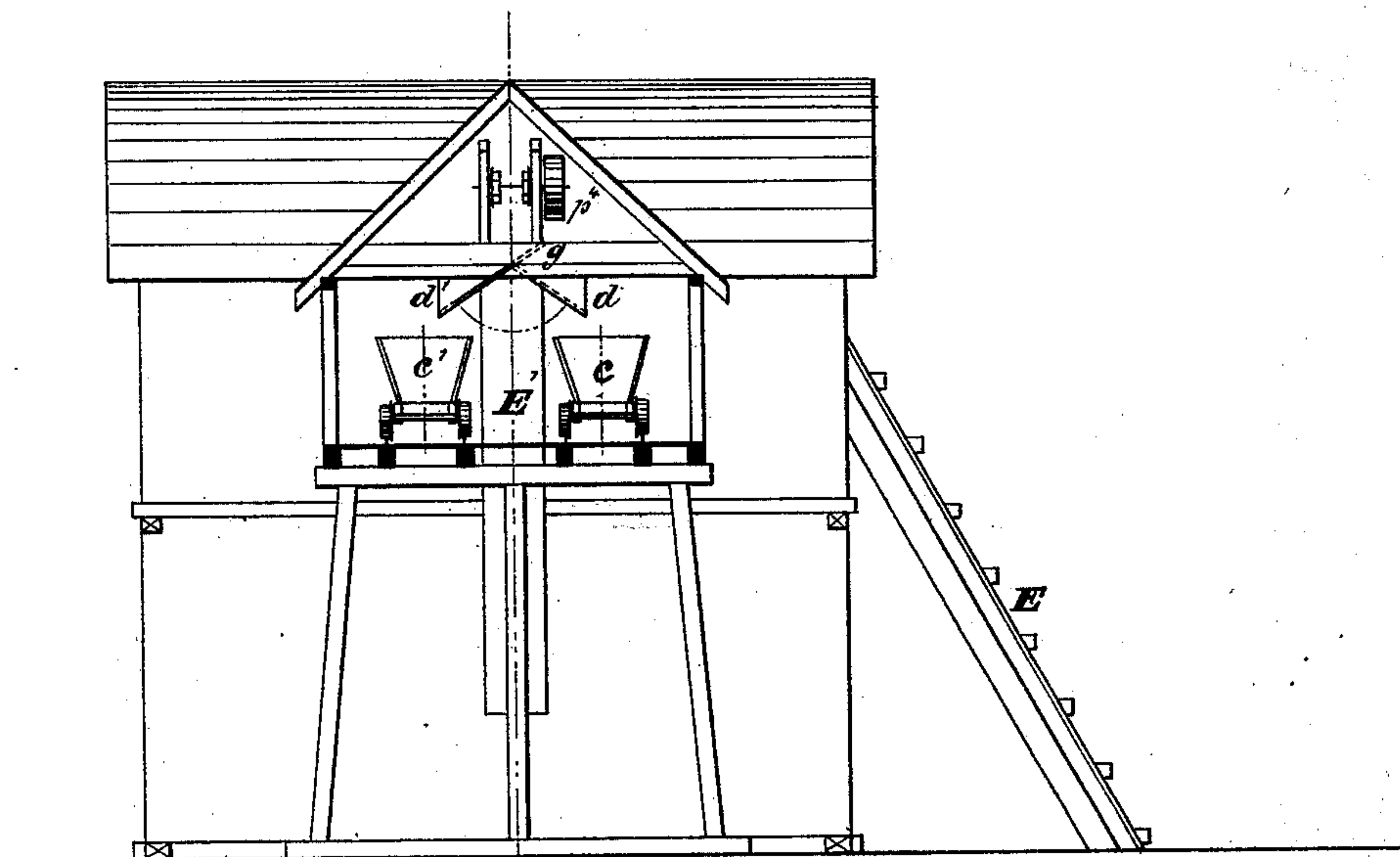


Fig. 4.

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# UNITED STATES PATENT OFFICE.

SEBASTIAN STUTZ, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN PROCESSES AND APPARATUS FOR WASHING BITUMINOUS COAL.

Specification forming part of Letters Patent No. **215,181**, dated May 6, 1879; application filed March 19, 1878.

*To all whom it may concern:*

Be it known that I, SEBASTIAN STUTZ, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and Improved Process of Treating Bituminous Coal, and machinery therefor; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section in line *x x* of Fig. 2. Fig. 2 is a plan. Fig. 3 is a vertical section in line *z z* of Fig. 2. Fig. 4 is a vertical section in line *y y* of Fig. 2; and Fig. 5 is a detached partially sectional view of the hinged gate.

Similar letters of reference in the several figures denote the same parts.

This invention relates to the preparation of bituminous coals for use in gas-retorts and furnaces, and has for its object to facilitate, simplify, cheapen, and otherwise improve the machinery and processes by which such preparation is effected.

The invention consists, first, in a new mode or process of treating the coal for the purposes referred to; and, secondly, in an improved mechanism by which such new mode or process may be carried into operation, substantially as I will now proceed to set forth.

In the preparation of coal for the market it has heretofore been customary to break, or, by rolls, crushing-wheels, or otherwise, reduce the coal to small lumps or pieces, which have been next separated by grading-sieves into the different market grades, according to the size of the pieces, after which the different grades have been separately washed, purified of foreign matters, dried, and put onto the market. This process is still indispensable for anthracite coals for the general market; but for the treatment of bituminous coals I have improved the process, as follows: I first pass the impure coals between powerful crushing-rolls adjusted so closely together as to reduce the entire mass below grade—that is to say, into particles so small as to be under the smallest size adapted for any of the market grades, and so nearly approximating the ordinary coal-dust as to be for all practical purposes substantially uniform with and the equivalent of such dust.

This object is accomplished by setting the rolls at a distance of about three-sixteenths of an inch (more or less) apart. The coal being thus, as a preliminary step, reduced below all grading, the grading part of the old process is dispensed with, and the crushed impure coal is delivered directly from the rolls to a hydraulic separator, where it is dumped upon a sieve or sieves and subjected to the action of pulsating currents of water operating upward through the sieves, by which the heavy impurities settle beneath the coal, the light impurities are washed away, and the coal is gradually separated and removed from the pieces of slate and other heavy sediment on the sieves. The improved process does not consist alone in crushing the coal to a uniform dust, nor in separating the impurities by a hydraulic separator, but in crushing it first, and then, without any preliminary sifting and grading, passing it directly to the hydraulic separator and separating and washing the entire mass thereby.

In this improved process the fine comminution of the coal enables me to dispense with the sifting and grading, renders the subsequent operation of the hydraulic machine more easy and its separating action upon the mass more nearly perfect, and thereby not only saves the expense and wear and tear of machinery, but greatly diminishes the waste and loss of the coal itself.

The mechanism which I prefer for the working of this process, and which I have adopted for the purpose, may be described as follows, making reference to the accompanying drawings:

H is a coal-reservoir hopper, having its sides contracted toward the bottom, and having a recess, *h*, in its bottom and in one side. E is an elevator of the usual construction, having its lower end in the recess *h*, and its upper end at a suitable height to enable it to dump the elevated coal upon an incline or chute, *e*, which conducts it to the crushing-rolls.

C C are the crushing-rolls, made of equal or different sizes, and preferably arranged in two pairs, one directly over the other, the upper rolls partially reducing the coal, and the lower pair completing the reduction to the size required.



Inasmuch as many kinds of bituminous coal are oily and gum the rolls, I prefer to direct a stream of water upon the rolls when in action, using a pipe or hose (not shown in the drawings) for the purpose of conducting the water to them; and, as the water would be liable to wash away some of the fine coal-dust and thus waste the material, I arrange the separator S directly beneath the crushing-rolls, and conduct the crushed coal into it by means of a tapering chute, J, into the wide upper end of which the crushed coal falls from the rolls. The separator which I prefer to employ is of the construction which I have heretofore patented, and therefore need not be more particularly described herein. I prefer to use a separator with two sieves, and therefore I divide the chute J into two passages by means of a vertical partition, *f*, (shown in dotted lines in Fig. 3,) one of said passages directing the coal-dust onto one of said sieves, and the other onto the other sieve. The pure washed coal is delivered from the separator at *o* into a hopper, *b*, whence it is raised by an elevator, *E'*, having the usual buckets *a a*, and is discharged upon a double chute, which overhangs two parallel railways. Cars *c c'* are conducted by the railways beneath the double chute, and are alternately filled therefrom, a car filling on one track while the car on the other track is being removed and an empty car brought to replace it.

The double chute is represented at *d d'* in Fig. 5, and is provided with a pivoted gate, *g*, at the apex of the two inclines, controlled by a lever, *l*, which extends down within reach of the attendant. By swinging the gate to a vertical position, as shown, both cars may be filled simultaneously, and by swinging the gate to one side or the other either car may be separately loaded at the will of the attendant.

The working mechanism is so connected that the speed of the feed-conveyer E will always automatically adjust itself to the speed of the

crushing-rolls, which is easily effected by driving it from the roll-shaft by means of two pulleys, *r r'*, and a belt. The machinery is driven by power applied at a wheel and shaft, P, near the base of the apparatus. From the shaft P the power is communicated by a belt to a counter-shaft, *m*, and thence by bevel-gears *w w* to two other counter-shafts, *n* and *i*.

The rolls are provided with fast and loose pulleys *p<sup>1</sup> p<sup>2</sup>*, and are driven by a belt from a pulley, *p*, on shaft *m*. The elevator *E'* is driven from shaft *n* by a belt and pulleys, *p<sup>3</sup> p<sup>4</sup>*; and the separator S is driven from shaft *i* by a belt and pulleys, *p<sup>5</sup> p<sup>6</sup> p<sup>7</sup>*, the two driven pulleys being fast and loose.

Belting is employed in preference to gearing, to prevent breakage in case a piece of iron or other refractory substance should get between the rolls; and the rolls and separator are provided with fast and loose pulleys, in order that either may be thrown out of action without interrupting the other, and that either may be worked separately if desired.

Having thus described my invention, I claim as new—

1. The improved mode or process of treating bituminous coal, consisting in first comminuting it to fine particles, substantially uniform with coal-dust, then passing it directly without grading to a hydraulic separator, whereby it is washed and separated from the impurities, substantially as described.

2. The combination of the crushing-rolls, the chute J, with its partition *f*, arranged directly beneath them, and the hydraulic separator or washer having two or more sieves arranged under the compartments formed by the partition *f*, substantially as described.

SEBASTIAN STUTZ.

Witnesses:

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GEO. W. MCLEAN.