No. 890,625.

T. A. EDISON. PATENTED JUNE 16, 1908.

APPARATUS FOR GRINDING COAL.

APPLICATION FILED NOV. 27, 1906.

3 SHEETS—SHEET 1.

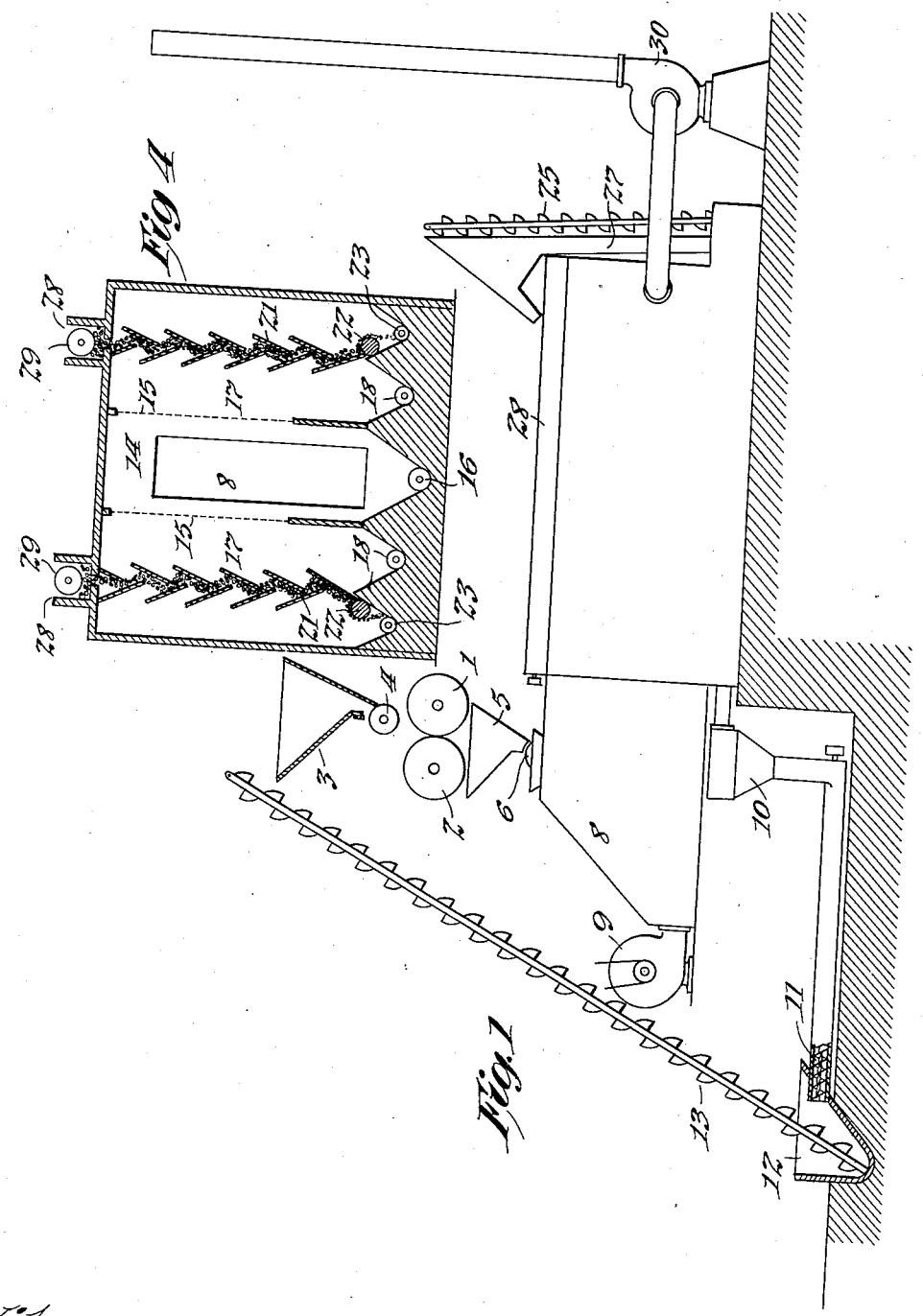

Fig. 1

Witnesses:
Frank D. Lewis
Mary J. Laidlaw.

Inventor:
Thomas A. Edison
by Frank L. Dyer
Atty.

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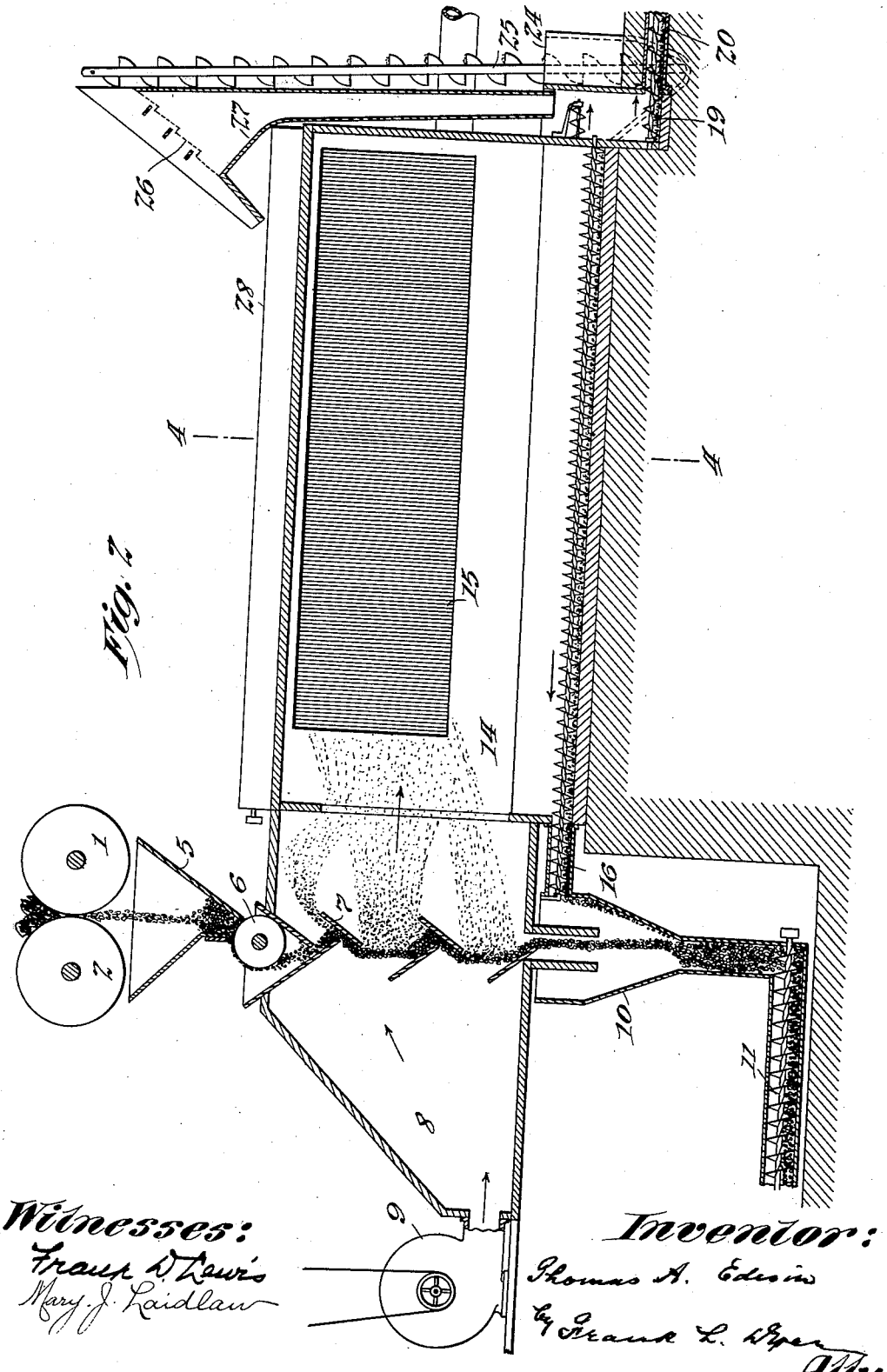
3 SHEETS—SHEET 2.



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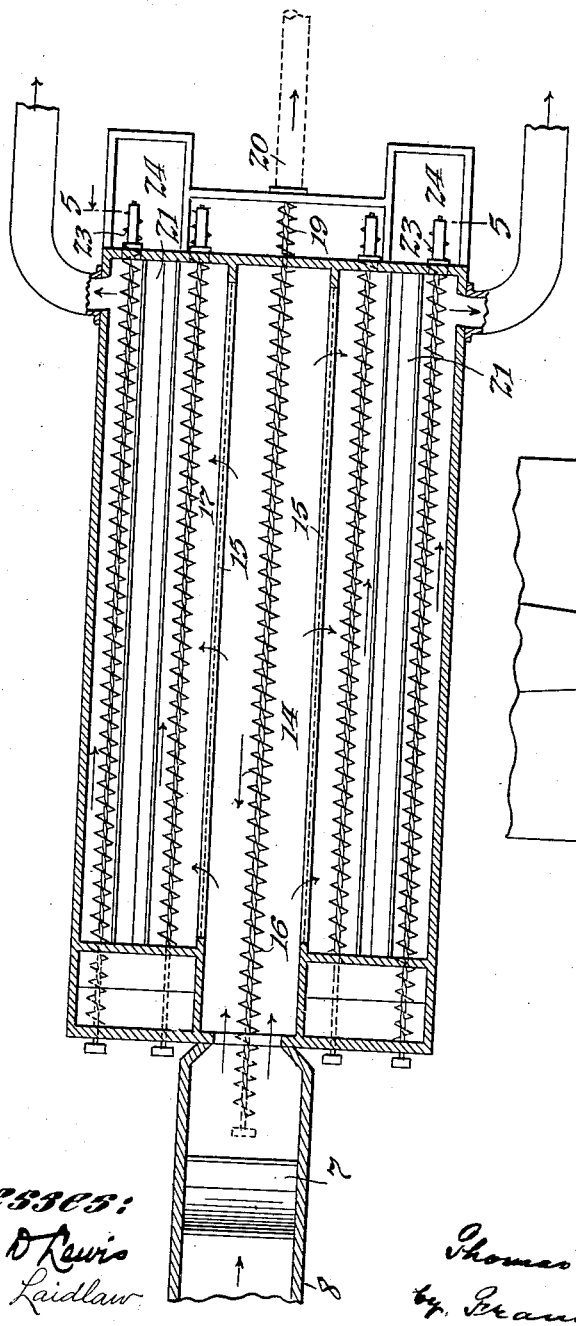

Fig. 3

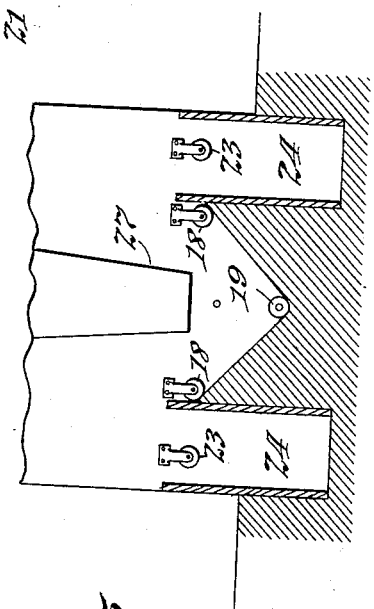

Fig. 5

Witnesses:
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Mary J. Laidlaw

Inventor:
Thomas A. Edison
by Frank L. Dyer
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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY.

APPARATUS FOR GRINDING COAL.

No. 890,625. Specification of Letters Patent. Patented June 16, 1908.

Application filed November 27, 1906. Serial No. 345,329.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Grinding Coal, of which the following is a description.

My invention relates to an improved apparatus for the fine grinding of coal preparatory to use in connection with fire boxes and other industrial apparatus.

At the present time the fine grinding of coal is performed in tube mills, ball mills and Griffin mills, the sizing of the particles being effected by screening devices through which air currents carrying the fine particles, are slowly circulated. Apparatus of this sort is extremely slow in operation and a plant of any considerable capacity occupies a relatively enormous space.

The object of my invention is to provide an apparatus for the fine grinding of coal in which the reduction is effected by means of grinding rolls and in which the sizing is secured by means of air blasts, whereby the apparatus will be very compact, of enormous capacity compared with the present devices, and in which the grinding of the coal can be carried on in entire safety and without danger of explosion.

To this end the invention comprises a pair of grinding rolls for reducing the coal, which latter is allowed to fall or flow substantially at right angles to an air blast, whereby the finer portions of the coal will be blown out, after which the air currents with their load of fine particles are directed to a suitable settling chamber and filtering device, by means of which the solid particles will be separated from the air.

Preferably, the apparatus is of such a character that the particles which are sufficiently small to be carried off by the air blast, but which are too coarse for the intended use, will be returned automatically to the grinding rolls for further reduction. Also, the apparatus preferably comprises one or more settling chambers in which much of the impalpable dust will settle before reaching the filtering devices, which dust will be automatically carried to a suitable stock house, or other point of storage. The filter which I preferably use for the purpose is one having automatically renewable filtering media, whereby the resistance to the passage of the air currents will remain constant, so that the effect of the blast will be uniform at all times. Such a filtering operation can be obtained by causing the air currents to pass through filtering walls or partitions, formed of a slowly moving load of granular material, such as coarse sand or crushed cement rock, the particles of which vary in diameter from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch. Provision is made for separating from the granular material, the load of impalpable coal dust, mechanically separated thereby from the air currents, and the dust so separated will be automatically forwarded to the stock house or other point of deposit.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a side elevation of the apparatus in its preferred form, Fig. 2, is a longitudinal sectional view, of a portion of the apparatus on an enlarged scale, Fig. 3, a horizontal sectional view, illustrating the several conveyers, Fig. 4, a cross sectional view on the line 4—4 of Fig. 2, and Fig. 5, a similar view on the line 5—5 of Fig. 3.

In all of the above views corresponding parts are represented by the same numerals of reference.

1—2 represent two grinding rolls for grinding the coal, supplied thereto from a hopper 3, by means of a roller feed 4. From the grinding rolls the material falls into a hopper 5, from which it is fed by a roller feed 6, in a sufficiently wide stream, so as to flow over the inclined shelves 7—7. These shelves are located in a blast chamber 8, supplied with an air blast from a blower 9. The air currents in passing through the channels between the inclined shelves 7, will carry off the sufficiently fine particles into the settling and filtering devices, the velocity of the blast being suitably adjusted for this purpose. The coarse particles which are not carried off by the blast fall into a hopper 10, from which they are conveyed by a conveyer 11, to the boot 12, of an elevator 13, by which they are elevated to the hopper 3 to again pass through the crushing or grinding rolls, as will be understood. From the blast chamber 8, the air currents carrying the solid particles of coal, enter the settling chamber 14, formed between two screens 15—15, of sufficient fineness of mesh to separate the particles which are too coarse for effective use, and

which require to be returned to the grinding devices. The particles which thus are deposited in the settling chamber 14, are automatically removed from the same by a conveyer 16, leading to the hopper 10. The settling chamber 14 is of large size, so that the velocity of the air currents entering the same will be checked, permitting the deposit of the particles which are too large, and allowing the air currents carrying the fine dust to pass slowly through the screens 15 into settling chambers 17. In these latter settling chambers, a considerable portion of the fine dust will settle by gravity and will be carried off by conveyers 18, which pass through the rear wall of the filtering apparatus and deposit the dust in engagement with a conveyer 19 located in a pipe 20, and leading to a suitable stock house, or other point of deposit. The outer walls of the two settling chambers 17 comprise the filtering medium, which is preferably composed of a slowly moving load of relatively coarse particles, such as coarse sand or ground cement rock, which material is supported by the inclined shelves 21, and is kept in slow movement by roller feeds 22. The load of coarse particles comprising each filter presents innumerable tortuous channels through which the air will be allowed to seep slowly and within which the impalpable dust will be separated. The filtering material with its load of separated dust slowly fed downwardly by the roller feeds 22, is delivered onto conveyers 23, and is carried to the rear of the apparatus and deposited in the boots 24 of elevators 25. The elevators 25 carry the coarse material with the fine dust mechanically entrained therewith, and deposit the same on a plurality of screens 26 by which the fine material will be separated from the coarse material. The screening operation can be very perfect, because of the great difference in size between the coal dust and the coarse material. From the screens 26 the dust falls into a chute 27, which leads to the conveyer 19, by which the fine dust will be carried to the stock house. The coarse particles passing over the screens 26 will be deposited in the chutes 28, and by the conveyers 29 will be again distributed over the inclined shelves 21, to again pass vertically downwards and effect a filtering operation.

If desired, the circulation of the air currents may be facilitated by connecting an exhaust fan 30, with the filtering apparatus outside of the two filtering walls, as shown.

It will be seen that the apparatus is entirely automatic in character and by using settling chambers and filters as explained, a very perfect separation of the fine dust from the air currents can be effected, so that the air currents will leave the apparatus in an entirely safe condition. Furthermore, the entire apparatus can be completely sealed in, so as to reduce the danger to the minimum. By using grinding rolls for the grinding of the coal, I am enabled to handle enormously greater loads of material than would be possible with tube mills or Griffin mills, so that the apparatus may be made extremely compact.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. In apparatus for grinding coal, the combination with suitable grinding devices, means for presenting the ground material to the effect of a blast of air, whereby the finer portions of the ground material will be separated therefrom, a settling chamber in which a portion of the fine particles will be separated from the air currents by gravity and a filter comprising a constantly moving wall of granular material presenting a constant resistance at all times, substantially as and for the purposes set forth.

2. In apparatus for grinding coal, the combination with suitable devices for grinding the coal, means for presenting the same to the effect of an air blast, a main settling chamber to which the air currents with their load of fine particles are directed, and in which the coarser portions of such particles will be separated by gravity, a screen through which the air currents pass from said settling chamber, and an auxiliary settling chamber in which a portion of the fine dust will be separated by gravity, a filter through which the air currents pass and in which the remaining portion of the fine dust will be separated, and means for returning the material accumulating in the main settling chamber to the grinding devices, substantially as and for the purposes set forth.

3. In apparatus for grinding coal, the combination with suitable devices for grinding the coal, means for presenting the same to the effect of an air blast, a main settling chamber to which the air currents with their load of fine particles are directed, and in which the coarser portions of such particles will be separated by gravity, a screen through which the air currents pass from said settling chamber, an auxiliary settling chamber in which a portion of the fine dust will be separated by gravity, and a filter comprising a moving wall of granular material having a constant resistance at all times, substantially as and for the purposes set forth.

4. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the ground coal to the effect of an air blast by which the finer portions thereof will be carried off, a main settling chamber, screens constituting the side walls of said settling chamber, and a filter outside of each of said screens, substantially as and for the purposes set forth.

5. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the ground coal to the effect of an air blast by which the finer portions thereof will be carried off, a main settling chamber, screens constituting the side walls of said settling chamber, and a filter presenting a constant resistance at all times, substantially as and for the purposes set forth.

6. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the ground coal to the effect of an air blast by which the finer portions thereof will be carried off, a main settling chamber, screens constituting the side walls of said settling chamber, a filter outside of each of said screens, and means for returning material deposited in the settling chamber to the grinding rolls, substantially as and for the purposes set forth.

7. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the ground coal to the effect of an air blast, whereby the finer portions will be separated, a main settling chamber into which the air currents with their load of fine material are directed, screens constituting the side walls of said main settling chamber, an auxiliary settling chamber outside of each of said screens, and a filter constituting the outer wall of each auxiliary settling chamber, substantially as and for the purposes set forth.

8. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the ground coal to the effect of an air blast, whereby the finer portions will be separated, a main settling chamber into which the air currents with their load of fine material are directed, screens constituting the side walls of said main settling chamber, an auxiliary settling chamber outside of each of said screens, and a filter comprising a moving wall of granular material presenting a constant resistance and constituting the outer wall of each auxiliary settling chamber, substantially as and for the purposes set forth.

9. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the coal to the effect of an air blast, and a filter to which the air currents with their load of fine material are directed and constituting a wall or partition of coarse material, substantially as and for the purposes set forth.

10. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the coal to the effect of an air blast and a filter to which the air currents with their load of fine material are directed and constituting a wall or partition of coarse material, and means for keeping the coarse material in slow movement, substantially as and for the purposes set forth.

11. An apparatus for grinding coal, comprising in combination a pair of grinding rolls for grinding the coal, means for presenting the coal to the effect of an air blast, and a filter to which the air currents with their load of fine material are directed, constituting a wall or partition of coarse material, means for keeping the coarse material in slow movement, and means for screening the fine dust accumulated by the coarse material and for returning the coarse material to the filter wall, substantially as and for the purposes set forth.

This specification signed and witnessed this 23rd day of November 1906.

THOMAS A. EDISON.

Witnesses:
FRANK L. DYER,
ANNA R. KLEHM.