H. W. NAGEL.

SAND DRYING PLANT.

APPLICATION FILED APR. 23, 1919.

1,346,238.

Patented July 13, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

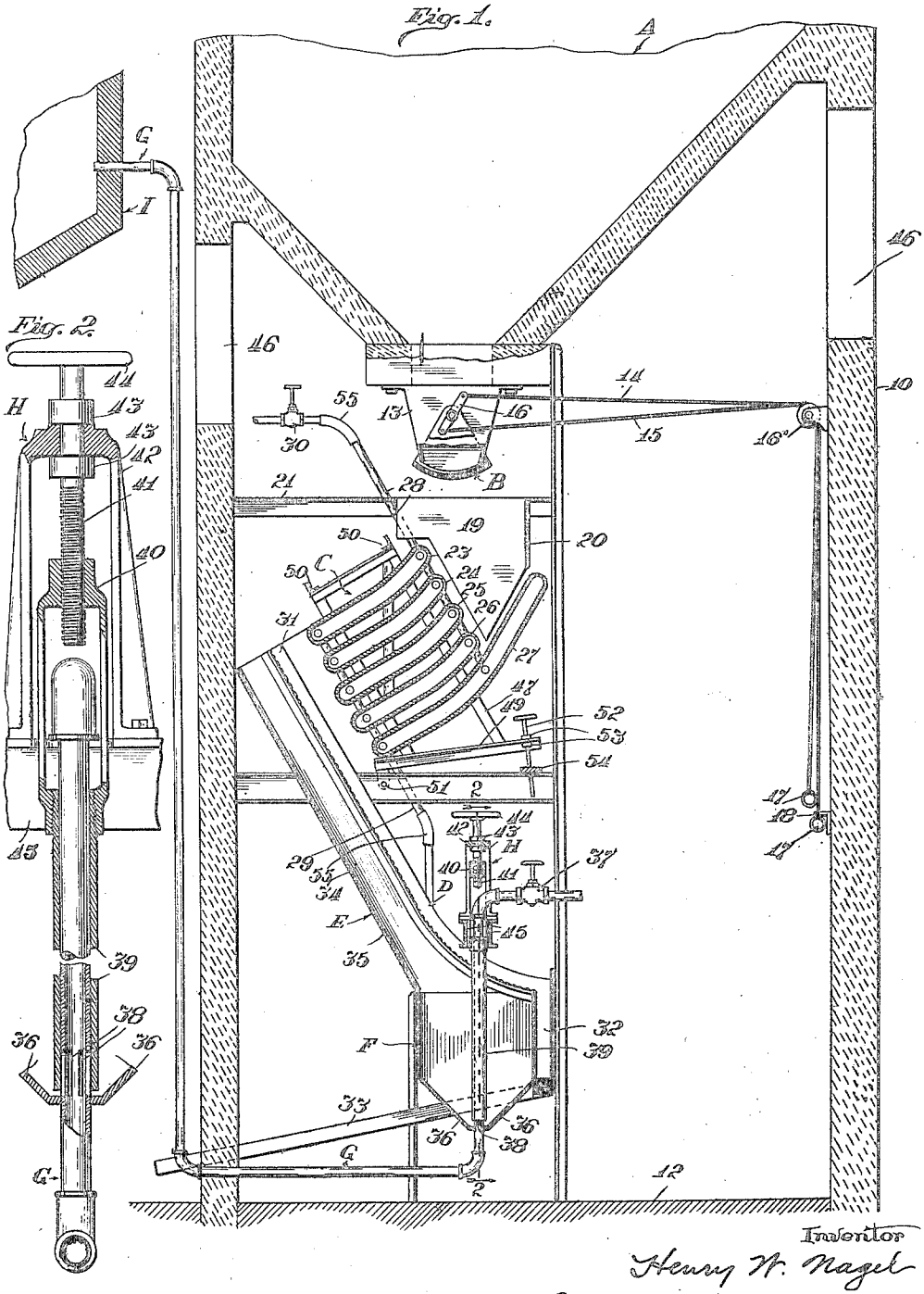

Fig. 2.

Inventor

Henry W. Nagel

By J. H. Ferguson

Attorney.

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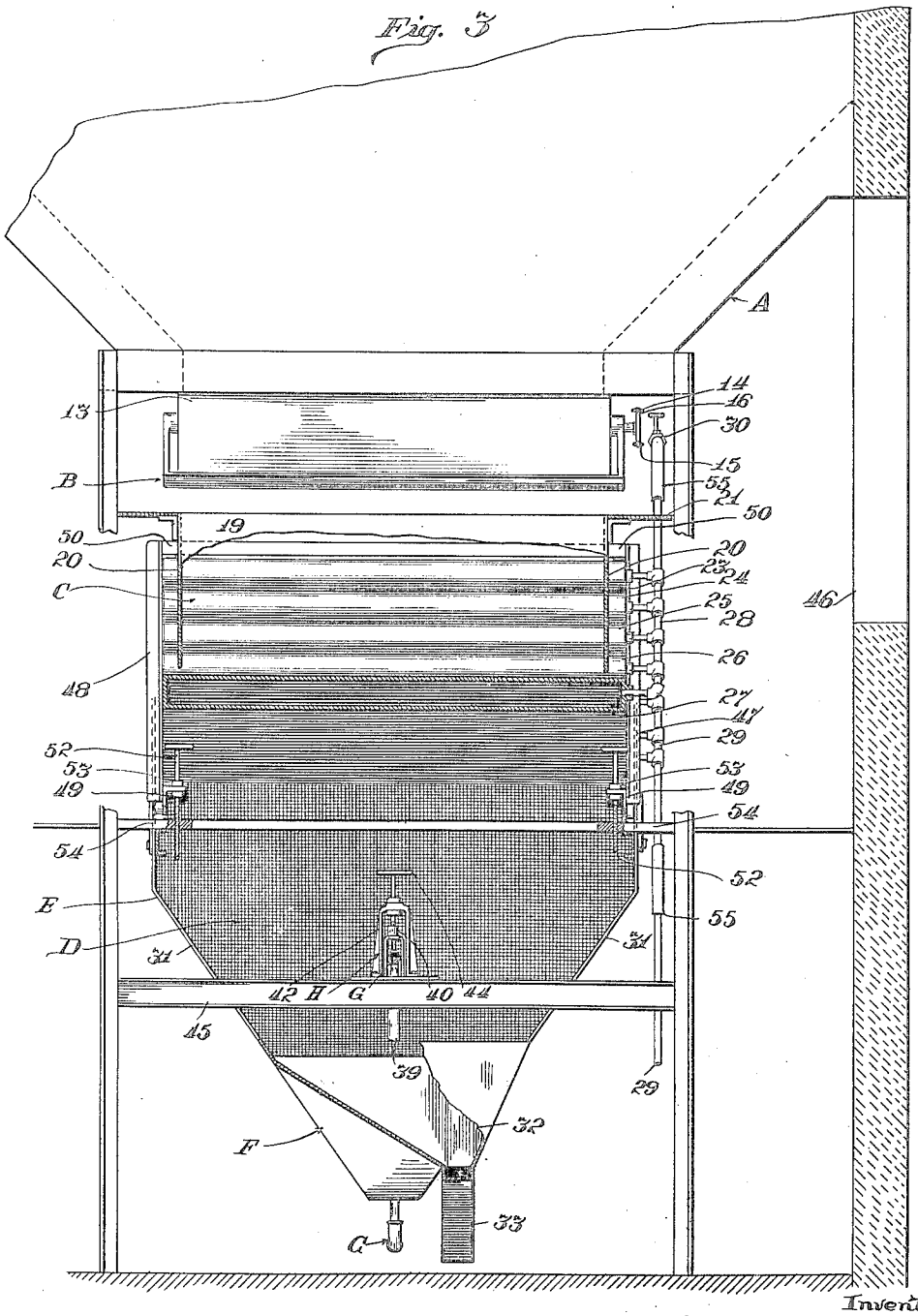
2 SHEETS—SHEET 2.

Fig. 3



Inventor

Henry W. Nagel

By D. W. Ferguson

Attorney.

UNITED STATES PATENT OFFICE.

HENRY W. NAGEL, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO AUGUST C. RONDA.

SAND-DRYING PLANT.

1,346,238. Specification of Letters Patent. Patented July 13, 1920.

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To all whom it may concern:

Be it known that I, HENRY W. NAGEL, a citizen of Germany, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Sand-Drying Plants, of which the following is a specification.

The present invention relates to sand plants of the kind commonly employed by railroads to dry the sand used in its locomotives for track sanding purposes.

The principal objects of the invention are to provide a plant which will not require as high a structure as heretofore, which will be more efficient in drying the sand than prior art plants, and which will be more economical in the cost of initial installation and subsequent maintenance. With these objects in view, the invention includes not only a novel arrangement of the parts but also certain improvements in the sand heating and drying elements and in the means for delivering the dried sand to the storage bin or other delivery point.

The various features and advantages of my invention will be more fully understood upon a consideration of the following detailed description taken in connection with the accompanying drawing while the scope of the invention will be particularly pointed out in the appended claims.

In said drawing Figure 1 is a sectional elevation of a sand plant constructed in accordance with the present invention; Fig. 2 is a view of that portion of the mechanism which controls the delivery of sand from the dry sand hopper; and Fig. 3 is a side elevation of the sand drying elements. Throughout these views like characters refer to like parts.

Referring to the drawing in detail, A designates the sand bin, B the gate for controlling the discharge of sand from the bin, C the heating elements to which the sand is delivered from the bin, D the screen by which the refuse is removed from the dried sand, E a chute and F a hopper for receiving the sifted dried sand, G a compressed air pipe through which dried sand is delivered from the hopper F, H a valve mechanism for controlling the discharge from the hopper F, and I a storage bin for the dry sand.

The sand bin A may be of any preferred construction. In the present instance it is shown as forming part of a building having the walls 10 resting upon a suitable foundation and having the floor 12. Such structures are commonly built of reinforced concrete. At the bottom of the bin A is a spout 13 which may be composed of cast iron or other suitable material. It is secured to the concrete structure in any desired way. The outlet of this spout 13 is opened and closed by the gate B which is pivoted to the spout and controlled in its operation by cords 14 and 15 attached to the ends of the cross arm 16 upon the gate pivot. In the present instance these cords pass over pulleys indicated at 16′ and end in rings 17 within the reach of an attendant who may pull the cords to open and close the gate B. A notched angle iron 18 on wall 10 serves as a means for holding the taut cord in position.

Directly beneath the spout 13 and gate B is a sand receiving space or hopper 19 which is formed in part by the heating elements C and in part by surrounding walls 20. In this instance these walls extend downward from a floor 21.

The heating elements C are, in the present instance, five in number, designated 23, 24, 25, 26 and 27. Each of these elements is a relatively flat, hollow member which is tapped at one point for the admission of steam from the supply pipe 28 and is tapped at another point for the discharge of steam into the discharge pipe 29. A valve 30 controls the steam supply. The various heating elements may be built up of structural steel or they may consist of cast iron if so desired. The arrangement of the heating elements is such that element 24 extends horizontally slightly beyond element 23, element 25 in like manner extends beyond element 24, element 26 extends in like manner beyond element 25, and then element 27 extends considerably beyond element 26 in an upwardly inclined direction. With this arrangement the element 27 forms one inclined wall of the hopper 19 and the ends of the elements 23, 24, 25 and 26 form another inclined wall of the same hopper. The latter wall, however, is provided with openings due to the spaces between the different elements. From this it will be seen that when the sand is delivered from the bin A into the space 19 it will work through the openings between the heating elements on to the surfaces of those elements. It will be noted that the

heating surfaces upon which the sand must travel in its passage over these elements have a varied inclination. That portion of the surface of each element which is toward the receiving end is steeper than that portion which is toward the delivery end. The reason for this is that the sand delivered from the bin A is wet and requires a steeper surface in order to be fed along it than does the sand after it becomes partly dried as will be the case where it is passing over that portion of the element toward the delivery end. In other words, the sand when wet requires a steeper inclination for a given speed than when dry. Where it is wettest the inclination is steepest. This arrangement also provides for a fairly uniform rate of travel of the sand over the heating elements.

As the sand is delivered from the heating elements it drops on to the screen D which is inclined at a sufficient angle to bring about a proper screening of the dried sand. Side boards 31 on either side of the screen serve to guide the refuse into a passage 32 and finally into the inclined discharge spout 33 by which it may be delivered at some convenient point for removal. The dry sand which passes through the screen D enters the chute E and is carried by it into the dry sand hopper F. The chute E is provided with side walls 34 and thus confines the sand so that all is delivered to the hopper. A floor 35 is located at a point where access can be had to the heating elements and the upper end of the screen. This floor may also serve in some measure to support these parts.

The dry sand hopper F has an inclined floor 36 which is steep enough to deliver the sand to the lowermost point of the hopper. The compressed air pipe G passes down through the hopper and out through an opening in its lowermost point, as clearly illustrated. This pipe G is connected with any suitable source of compressed air and the supply of air passing through the pipe is controlled by valve 37. In the present instance the delivery end of the pipe is located in the storage bin I. As shown more clearly in Fig. 2, the pipe G is provided at the lowermost point of the hopper F with a number of vertical slots 38. The sand in hopper F is free to pass through these slots into the interior of the pipe G and the arrangement serves as an ejector for carrying the sand up through the pipe G into the bin I. The extent to which the slots 38 are exposed to the sand in the hopper is varied by a loosely fitting sleeve 39 positioned about a portion of the pipe G and secured at its upper end to a yoke 40. This sleeve 39 serves as a valve to open and close the slots 38 and to vary the extent of the opening as may be found most desirable in any particular case. For the purpose of moving the sleeve 39, the yoke 40 is provided with a threaded opening into which the threaded end of a screw 41 passes. This screw also passes through an opening in pedestal 42 and by means of collars 43 and a hand wheel 44, the screw may be rotated without moving relative to the pedestal. This rotation, however, moves the yoke 40 and the sleeve 39 up or down according to the direction of rotation. The pedestal 42 rests upon a suitable support 45 which, in the present instance, is made of two channels as more particularly shown in Fig. 1. These channels are suitably supported in the adjacent walls of the building or in any other suitable way.

When the plant is in operation it will be obvious that a great deal of moisture will be driven from the sand by the heating elements C. Suitable openings 46 in walls 10 are provided as outlets for the moisture thus driven off. These ventilating openings might, of course, be differently located if desired.

As before noted, the inclined surfaces of the heating and drying elements C provide for a fairly uniform rate of flow of the sand while it is being dried. In some instances the characteristics of the sand may be such that it would be desirable to increase the rate of flow. In other instances it might be desirable to decrease that rate. Accordingly I preferably mount the heating elements C upon an adjustable frame made up of end members 47, 48, base members 49, and top members 50. These members are all secured together to form a crate-like inclosing frame for the heating elements. This frame is pivoted at 51 to beams of the floor 35 and rendered adjustable by screws 52. By manipulating the screws 52, the frame and heating elements may be readily adjusted to increase or decrease the angle of declivity of the surfaces over which the sand passes. Each screw 52 is rotatable with reference to the frame but is held from longitudinal movement relative thereto by collars 53. These screws are threaded through threaded openings in member 54 carried by the floor 35 and thus provide means for adjusting the position of the entire structure. In order to maintain a proper connection between the fixed and movable sections of the steam pipes 28 and 29 for the different positions of the frame and heating elements, the rigid pipe sections of each pipe are joined together by flexible sections, as indicated at 55.

In operation the sand passes from the bin A over the heating elements C down through the screen D leaving the refuse to be delivered by the spout or trough 33. The dried sand, accumulating in the hopper F, gradually passes through the openings 38 into the pipe G and thence up into the storage bin I. The amount of sand delivered from the bin A is regulated by the gate B. The amount of sand admitted to the

pipe G is regulated by the sleeve valve 39. The amount of steam is regulated by the valve 30 and the amount of compressed air by the valve 37. And the rate of travel is regulated by the adjusting screws 52.

It will be understood that certain changes and alterations may be made in the structure herein disclosed without departing from the spirit and scope of the present invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A sand plant comprising a sand bin having an opening through which the sand is adapted to flow by gravity, a gate for controlling said opening, spaced heating elements between and over which the sand is adapted to pass after leaving said bin, each of said elements having portions having different inclinations, said inclinations being steepest where the sand first flows and is wettest, and less steep at the points to which it passes after being partially dried, an inclined screen for shifting the sand as it leaves said heating elements, and a chute and hopper for receiving the shifted sand.

2. In a sand plant, a sand heating element having an inclined sand engaging surface over which the sand travels by gravity, said surface having portions of different inclinations relative to the horizontal, the steeper portion being toward the receiving end and the less steep portion being toward the delivering end, said element being hollow and having connections for receiving steam into its interior as the heating medium.

3. In a sand plant, a series of spaced sand heating elements having inclined surfaces over which the sand travels by gravity, the sand receiving end of each element, except the uppermost, extending horizontally slightly beyond the one just above it and the receiving end of the lowermost extending in an upwardly inclined direction considerably beyond the element just above it, thereby providing a sand receiving hopper having openings in one side through which the sand passes to the heating surfaces.

4. In a sand plant, a series of spaced sand heating elements having inclined surfaces over which the sand travels by gravity, the inclination of each of said surfaces being steeper toward its receiving end than toward its delivery end, the receiving end of each of said elements, except the uppermost, extending horizontally slightly beyond the one next above it and the receiving end of the lowermost element extending considerably beyond the element just above it in an upwardly inclined direction, thereby providing a sand receiving hopper having openings on one side through which the sand passes to the heating surfaces.

5. In a sand plant, a series of spaced sand heating elements having inclined surfaces over which the sand travels by gravity, a movable frame for supporting said elements, and means for adjusting said frame to change the inclination of said surfaces.

In testimony whereof, I hereunto subscribe my name this 18th day of April, 1919.

HENRY W. NAGEL.