(No Model.) 2 Sheets—Sheet 1.

F. V. GREENE.

APPARATUS FOR REDUCING NATURAL OR ARTIFICAL BITUMINOUS ROCK.

No. 415,167. Patented Nov. 12, 1889.

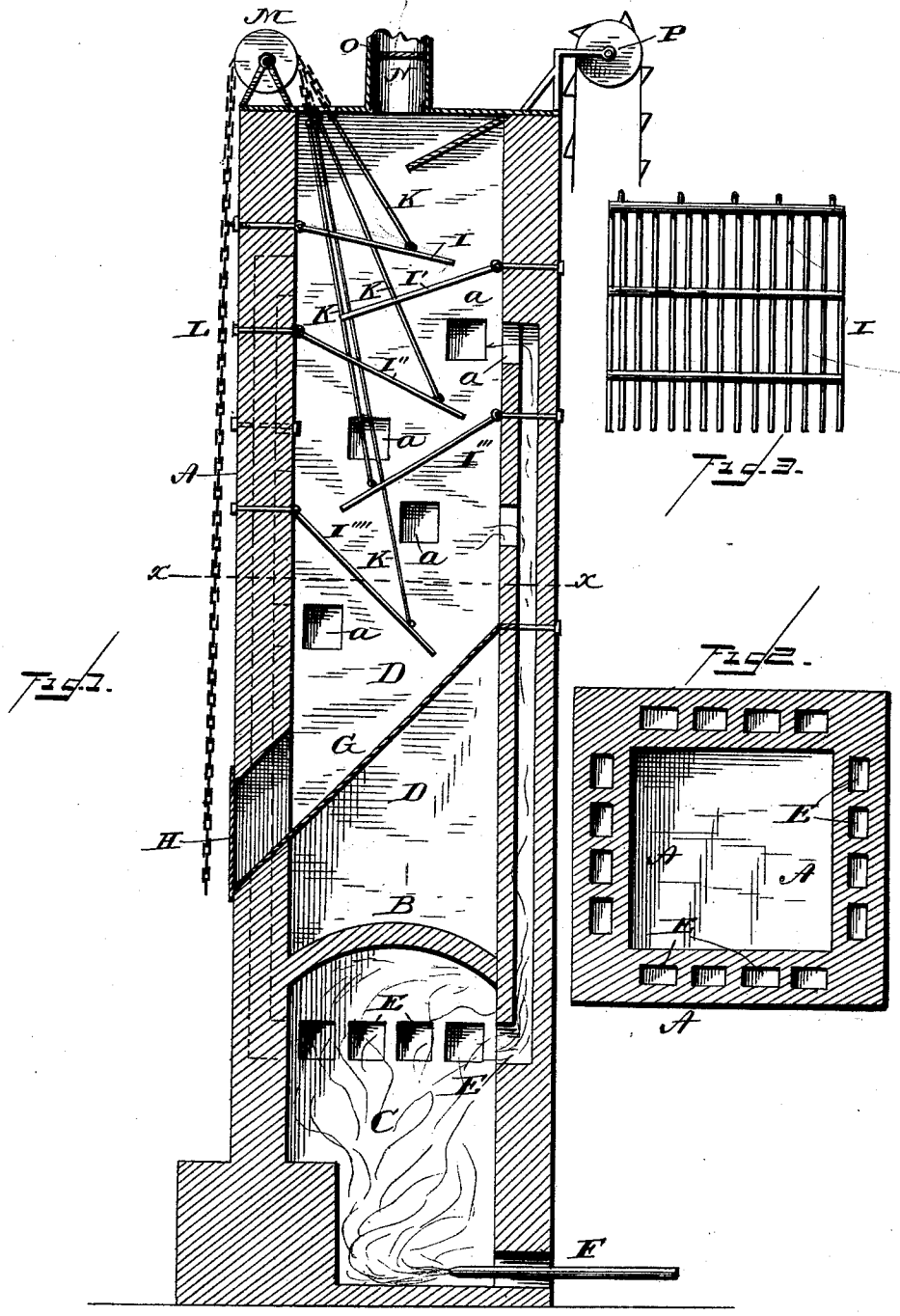


Fig. 1.

Fig. 3.

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

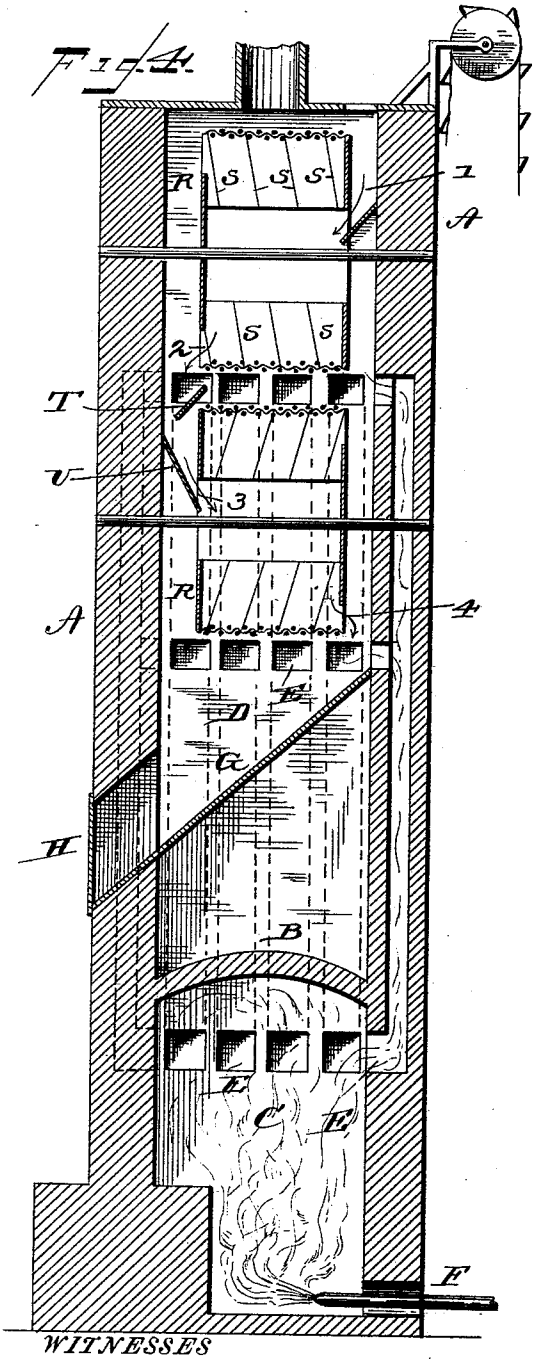


Fig. 5.

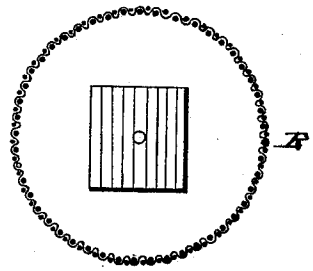
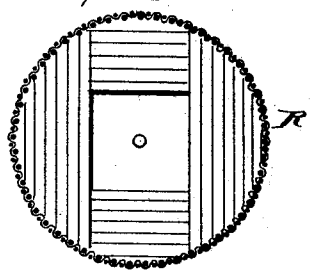


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANCIS V. GREENE, OF NEW YORK, N. Y., ASSIGNOR TO THE BARBER ASPHALT PAVING COMPANY, OF SAME PLACE.

APPARATUS FOR REDUCING NATURAL OR ARTIFICIAL BITUMINOUS ROCK.

SPECIFICATION forming part of Letters Patent No. 415,167, dated November 12, 1889.

Application filed July 8, 1889. Serial No. 316,805. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS V. GREENE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Apparatus for Reducing Natural or Artificial Bituminous Rock; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in devices for reducing natural or artificial bituminous rock to a condition in which it can be used for roofing and paving purposes.

The object of my invention is to provide means by which the various forms of bituminous rocks—*i. e.*, sandstone or limestone containing from eight to forty per cent. of bituminous material—can be reduced to a finely-divided condition by the application of heat without injury to the same; and to this end my invention consists in subjecting the bituminous material to the action of dry heat on open gratings or in wicker cylinders, so that it will be reduced to a finely-divided condition without destroying any of its cementing qualities. As heretofore practiced, these materials have been reduced to powder by the application of steam, which is injurious to some of their component parts. These materials have also been heated in shallow pans or kettles; but in such manipulations or treatment the material is liable to be burned, coked, or otherwise injured by the heat, so that it is necessary to keep the material constantly stirred at the expense of great labor in order to prevent the above-mentioned destructive effects.

Referring to the drawings, Figure 1 is a vertical sectional view of one form of my device. Fig. 2 is a horizontal sectional view on the line *x x* of Fig. 1. Fig. 3 is a top or plan view of one of the gratings on which the material is supported while being subjected to the calorific energy. Fig. 4 is a vertical sectional view of a modified form in which wicker-work cylinders are used instead of the gratings. Fig. 5 is the closed end of one of the wicker cylinders. Fig. 6 is the open end of one of the wicker cylinders.

A indicates the walls of the stack made of brick or stone and of either rectangular, circular, or other convenient or desirable form, and of suitable dimensions for the amount of material to be heated, say about six feet in diameter and from thirty to forty feet in height.

B is a fire-brick arch located near the base of the stack and which separates the stack into two chambers C and D, which prevents the products of combustion formed in the chamber C from coming into direct contact with the material to be heated in the chamber D.

E are a series of flues leading from the fire-chamber C and extending up into the walls of the stack, said flues being arranged to open into the chamber D through a series of openings *a*, so that the hot air and gases from the furnace or fire-chamber will be directed into and through the material to be treated. The heat used is by preference that generated by the burning of coal-oil supplied through a pipe F in the ordinary manner at the bottom of the chamber C; but other fuel may be employed to produce the requisite heat.

G is an inclined partition or chute made of heavy sheet-iron, and extends across the chamber D at an angle of about forty-five degrees and completely closes the stack, so as to prevent any of the material from passing through it and dropping onto the arch B. In connection with this inclined plane of metal is an opening through the side of the stack closed by a door H, of any suitable or desirable construction.

At suitable intervals above the inclined plane G are arranged a series of iron screens I, I′, I″, I‴, and I⁗, which are firmly attached at one end by hinges and bolts to each alternate side of the stack, and are sustained at any angle by means of the rods K and chains L. These chains L pass over a pulley M on top of the stack, and are fastened near the base of the stack to a suitable shaft having eccentric disks or other suitable devices

for raising or lowering the screens, so that they can be kept at such an angle as experience may show to be best suited.

The top of the stack is closed by means of an iron plate or other suitable device, the interior of the stack communicating with the external air by means of the smoke-stack N, said smoke-stack being provided with a suitable damper O, by which the temperature of the stack is regulated.

P is an elevator mounted in suitable supports in the top of the stack, said elevator being provided with the usual buckets for hoisting material to be heated to the top of the stack.

The operation of this form of construction is as follows: Bituminous rock, which, as before stated, may be either the natural rock or an artificial mixture of sand and asphalt or other bituminous material, is broken to the size of about three (3) inches in diameter and carried up and deposited or dumped into the top of the stack. The material first falls onto the upper screen I, the spaces between the bars of which are of proper size—say from two to two and one-half inches. The temperature of the stack being between 300° and 400°, the edges of the material are softened by the heat until it passes or can pass between the bars of the screen, and then falls upon the second screen I′, the bars of which are slightly nearer together than the screen above. In the same manner the heat softens the material until it can pass between the bars of the screen I″, and rolls along said screen in this manner, falling onto screen I‴ and finally onto the screen I⁗. From the screen I⁗ the material is discharged in the form of a hot sticky powder upon the inclined plane or chute G until it reaches the door H. The material is now discharged through the door H in the proper quantity into a measuring-box of the usual form, and then conveyed to a mixing-machine of the usual pattern, where it is thoroughly incorporated and a certain amount of pure bitumen or asphalt is added, if necessary, in order to have the proper proportions in the mixture. The hot mixture is then ready to be taken to the streets and laid as a pavement in the ordinary manner.

In Fig. 4 I have shown a modification in which wicker cylinders R are used instead of the screens heretofore described. In this construction the material to be treated is fed into the end of the cylinders, as shown at arrow L, and is moved over to the other end by means of helical blades S, where it is ejected, as indicated by arrow 2, onto the chute T, which directs it onto the chute V, from whence it is discharged into the end of the second cylinder, as indicated by the arrow 3. Any desired number of these cylinders may be used, and the meshes of the iron wicker of which the cylinders are made may be of different sizes, as heretofore explained with reference to the screens shown in Fig. 1. The lowest cylinder discharges the material onto the chute G, as indicated by the arrow 4.

The cylinders R are mounted in suitable bearings and adapted to be rotated in any convenient or suitable manner.

It will be noticed that only dry heated air is admitted to the stack, and that, as a consequence, the material is reduced without bringing it into contact with the more destructive elements of combustion.

What I claim is—

1. In a device for reducing natural or artificial bituminous rock, a series of screens or gratings of different mesh, arranged one above the other in a suitable stack or chamber, said stack or chamber being heated with hot air from a suitable furnace.

2. A device for reducing natural or artificial bituminous rock to a powdered or semi-plastic condition, consisting of a stack in which are mounted metallic screens for the reception of the material to be treated, and a series of flues leading from the combustion-chamber and discharging into the stack at different points, whereby the material is heated and reduced by coming in direct contact with heated air, as set forth.

3. In a device for reducing natural or artificial bituminous rock, a stack and a furnace communicating with said stack through flues in the side walls thereof, and a series of screens of different mesh arranged one above the other in the stack, as set forth.

4. In a device for reducing natural or artificial bituminous rock, a stack and a furnace communicating with said stack through flues in the side walls thereof, and a series of adjustable screens pivoted alternately to each side of the stack, whereby the material to be treated gravitates from one side of the stack to the other in its descent, as set forth.

5. In a device for reducing natural or artificial bituminous rock for paving and other purposes, a series of movable screens mounted in a stack, said stack being heated by hot air from a suitable furnace, and an inclined plane or chute located below the screens, provided with a suitable door, whereby the reduced material is collected, as set forth.

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

FRANCIS V. GREENE.

Witnesses:
JOHN P. WHITTHORN,
EDSON S. CHICK.