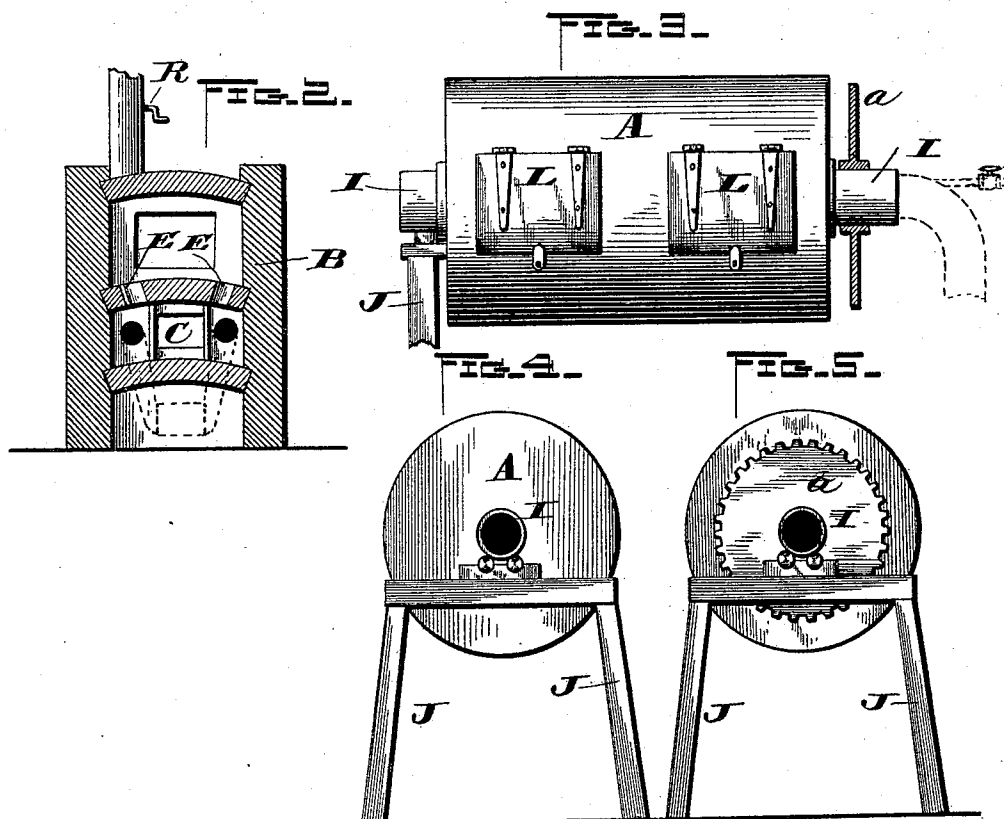
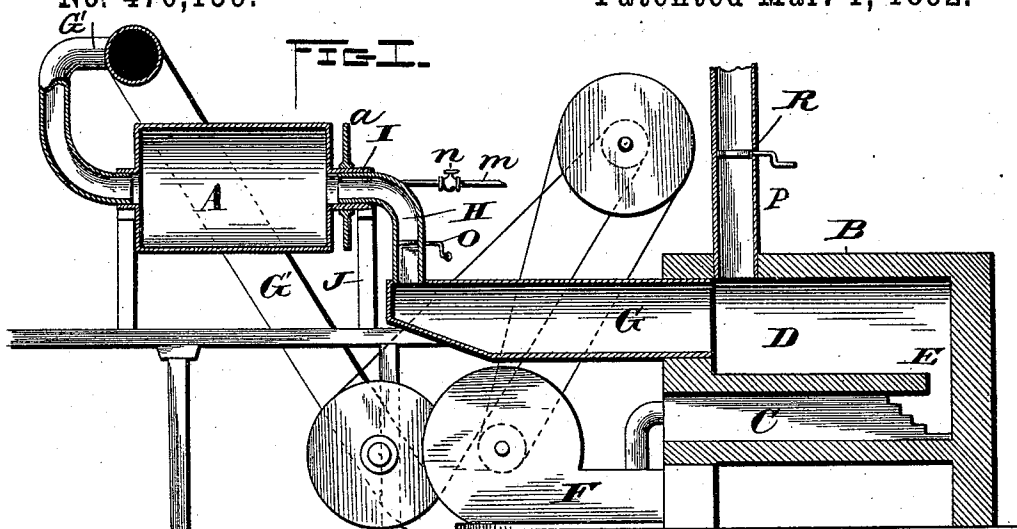


(No Model.)

H. J. WARREN.
METHOD OF AND APPARATUS FOR REDUCING NATURAL OR ARTIFICIAL
BITUMINOUS ROCK.

No. 470,159.

Patented Mar. 1, 1892.



WITNESSES

F. L. Curand

N. M. Osterling

INVENTOR

H. J. Warren

by L. W. Simsbury
Attorney

UNITED STATES PATENT OFFICE.

HENRY JACKSON WARREN, OF BUFFALO, NEW YORK.

METHOD OF AND APPARATUS FOR REDUCING NATURAL OR ARTIFICIAL BITUMINOUS ROCK.

SPECIFICATION forming part of Letters Patent No. 470,159, dated March 1, 1892.

Application filed October 23, 1890. Serial No. 369,079. (No model.)

To all whom it may concern:

Be it known that I, HENRY JACKSON WARREN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Methods of and 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 new and useful improvements in the method of and apparatus for the reduction of old asphalt mixture, rock-asphalt, or similar bituminous substances for the purpose of using the same for paving purposes.

The object sought in the present invention is to provide means for heating old asphalt mixture—such as is taken from the streets in the process of repairing—and reducing it to a plastic condition to be used again. By the use of the same process and apparatus I am enabled to reduce the natural rock-asphalt and other similar bituminous materials.

To effect the above results my invention consists in subjecting the bituminous material to the action of the heat in a revolving cylinder, so that it will be evenly subjected to the heat and at the same time be reduced to a plastic condition by the rotary motion of the cylinder.

The operation of the reduction of these materials to a proper condition for use has generally been one in which the material is either injured or coked by the application of extreme heat if not constantly stirred and attended, which primitive method is not practicable to any great extent and is expensive, as well as laborious.

Referring to the accompanying drawings, Figure 1 is a longitudinal sectional elevation of the heater, blower, and revolving cylinder, the heater and cylinder, with the pipe communicating therewith, being shown in section. Fig. 2 is a front elevation of the heater, the front wall being removed. Fig. 3 is a view of the revolving cylinder in elevation, showing the doors for the entrance and withdrawal of the material. Figs. 4 and 5 are front and back end views of the cylinder, showing the

manner in which they are mounted and the friction-rolls upon which the axis revolves. 55

As the main feature of the plant consists of the revolving cylinder A for containing the bituminous material, and in which it is subjected to the action of heat, and the heater B, from which the heat is discharged into the cylinder, they will be outlined together to show, briefly, the operation of the device and the functions of the several parts thereof. The heater B is preferably constructed of brick, having the fire-chamber or furnace C and the hot-air space D above the fire-chamber and the flues E communicating with the hot-air space D at the back of the fire-chamber. These flues E extend on each side of the fire-chamber, and the air forced there-through by means of the fan-blower F becomes mixed with the heated air from the fire-chamber. By means of the blower F the hot air from the air-space D can be driven into the distributing pipe or chamber G, where it enters the sheet-iron pipes H, leading to their respective cylinders. The heat after passing out of the cylinders in a partially-cooled condition is conducted back to the blower by the return-pipe G', requiring less heat to bring the air again to a heated state and at the same time confining the odors due to the heating of the asphalt. 60 65 70 75 80

The cylinder A is provided with the hollow axis I, which is riveted to the cylinder or formed integral therewith to constitute it a part of the cylinder. The cylinder is mounted on suitable supports J J, and the axis or journals I find a bearing on the friction-rolls with which the supports are provided. With in the hollow journal the end of the pipe G projects, and at the other end the partially-cooled air is conducted through the pipe G' back to the blower, which, while serving to drive the heat from the heater into the cylinder, also serves as an exhaust for the partially-cooled air, thus saving considerable heat and keeping up a constant circulation and destroying all the odors arising from the cylinders. 85 90 95 100

On the end of the axis or journal I is a sprocket-wheel *a*, by which the cylinder is geared to a driving-shaft driven from any suitable source of power and by which the cylinder *i* is made to revolve. 105

The cylinder A is provided with doors L,

by means of which the material to be treated is deposited into the cylinder or taken therefrom when properly reduced.

Leading to the revolving cylinder from a steam-boiler is a pipe M, provided with a steam-valve N, which can be operated to permit the passage of steam into the cylinder when the material is heated to such a point as to become plastic and adhere to the walls of the cylinder, and when it is necessary to use the steam it is simply to moisten the air and prevent the material from sticking. This steam-pipe *m* enters the hot-air pipe H at the elbow near the entrance of said pipe H into the cylinder A. A damper O is provided in the sheet-iron pipe H for the purpose of cutting off the heat at any time, and especially when it is desired to open the doors of the cylinder to take therefrom the reduced material. Within the stack P of the heater is also a damper R, by which the heat can be prevented from escaping through the stack and any surplus heat not needed allowed to escape.

The fuel used to generate the necessary heat is preferably oil or gas; but any fuel will suffice.

In order to aid in the reduction of the bituminous material within the cylinder, I introduce a few pieces of hard stone with sharp angles, which are caused by the rotary motion of the cylinder to pound and grind the material.

The operation of the device briefly, described, is as follows: The natural or artificial bituminous rock or old asphalt-pavement mixture or any other asphaltic or bituminous material is broken to suitable size and deposited in the cylinders through the doors L, and when charged sufficiently with the material each cylinder in turn is thrown into engagement with the driving-shaft through its gearing and made to revolve. At the same time the damper O in the sheet-iron pipe H is opened to admit the entrance of the dry heated air from the distributing-chamber G into the cylinder. The action of the heat upon the constantly-moving material is to subject it evenly to the heat and at the same time to cause it to resolve itself into a plastic condition. During this operation the material often adheres to the cylinder when it becomes heated to any great extent, and when such is the case steam is admitted into the cylinder through the steam-pipe M for the purpose of moistening the air and loosening the material. By means of the dampers O and R the heat is controlled to a certain extent; but for the purpose of delivering a current of cold air and also hot air that has already passed through the cylinders into the heater to the cylinders at any time the fan-blower is set to working, and by the construction of the heater the hot air can be driven out of the hot-air space E. The material when properly reduced is taken from the cylinders and, if necessary, mixed with other ingredients in a power-mixer, and is then ready for use.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The method herein described of reducing natural or artificial bituminous rock, which consists in introducing the material to be reduced into a hollow closed cylinder, causing the same to be highly agitated by rotating the cylinder, admitting a current of heated air into and through said revolving cylinder, and further admitting steam into the cylinder at any suitable stage of the reducing process to give the requisite moisture and prevent the material from sticking, substantially as described.

2. In a device for the reduction of natural or artificial bituminous rock, the combination of a hollow rotating cylinder having its ends provided with a hollow journal and a heater provided with a hot-air chamber, the said cylinders communicating with the hot-air chamber of the heater at one end and with the furnace at the other end through the hollow journals, substantially as described, and for the purpose set forth.

3. In a device for the reduction of natural or artificial bituminous rock or other asphalt or bituminous material, a revolving hollow cylinder, and a hot-air pipe communicating with the interior of said cylinder and to the distributing hot-air chamber communicating with the hot-air space of the heater, substantially as described, and for the purpose set forth.

4. In a device for the reduction of natural or artificial bituminous rock or other asphalt or bituminous material, a revolving hollow cylinder, a hot-air pipe communicating with the hot-air space of the heater, a steam-pipe communicating with said hollow cylinder through the pipe for communicating hot air thereto, and a blower for exhausting the partially-cooled heated air that has passed into the cylinder and causing a current of heated air to be maintained therein, substantially as described, and for the purpose set forth.

5. In a device for the reduction of natural or artificial bituminous rock, the combination of a revolving cylinder with a heater adapted to receive the current of heated air therefrom, the said cylinder having a return-flue connected thereto leading to a blower and communicating with the furnace, substantially as described, whereby the partially-cooled air from the cylinder is exhausted and driven into the heater for use, while a current of heated air is maintained in the cylinder, substantially as set forth.

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

HENRY JACKSON WARREN.

Witnesses:

M. B. SPENCER,
JESSE WARREN.