(No Model.) 2 Sheets—Sheet 1.

S. P. HALL & J. W. WOOD.

BITUMINOUS ROCK REDUCING MACHINE.

No. 484,735. Patented Oct. 18, 1892.

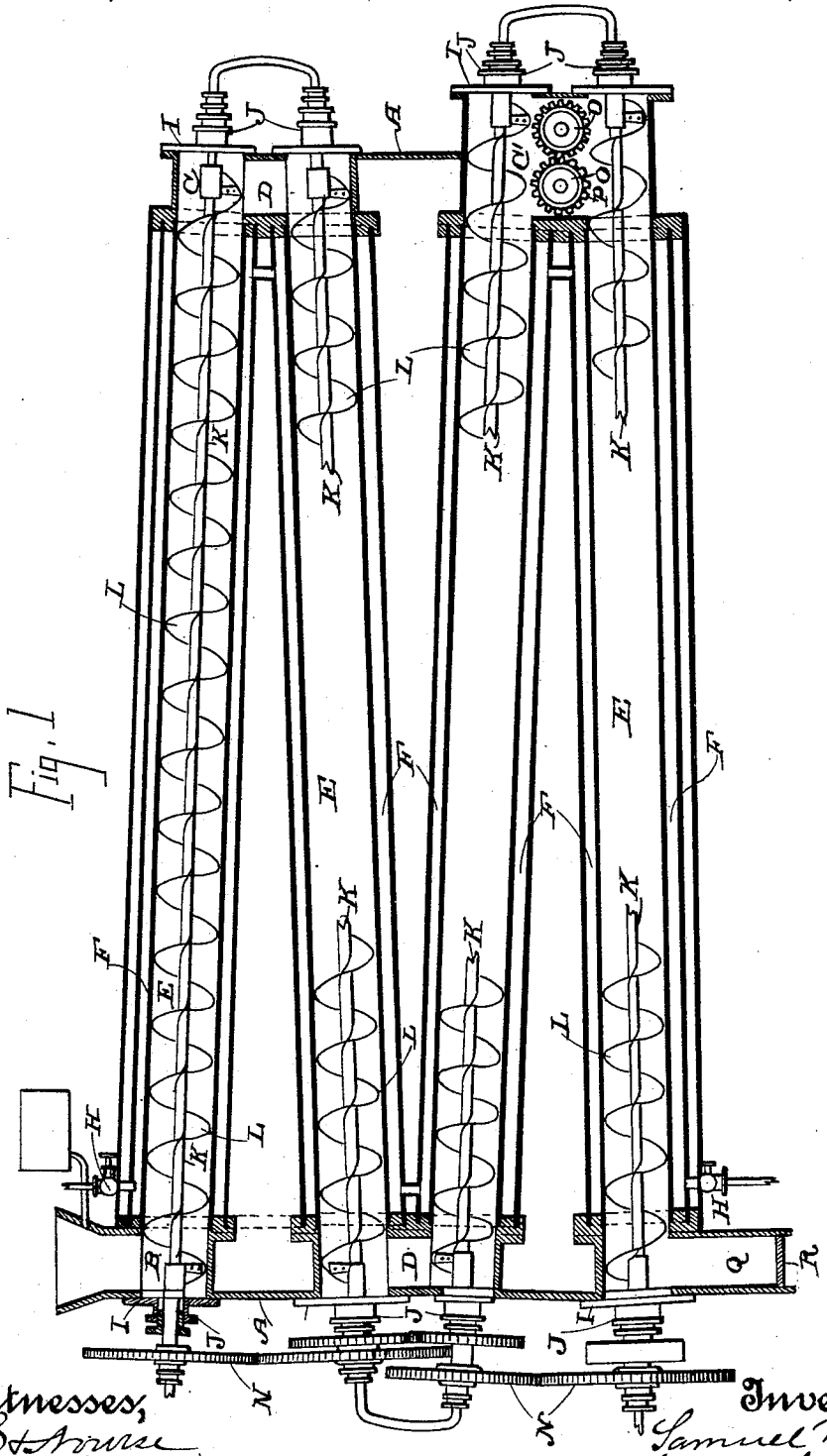

Fig. 1

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

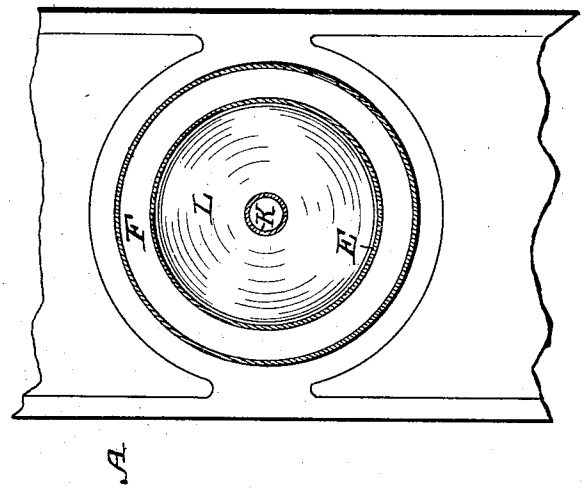
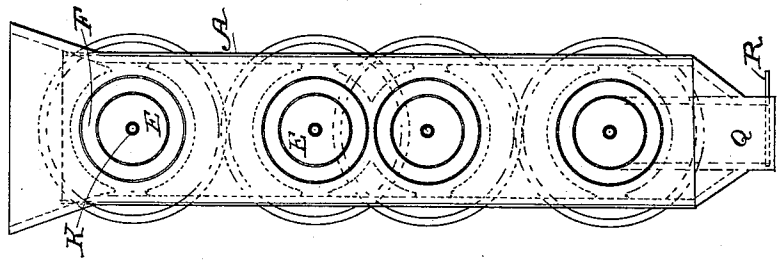


Fig. 2



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UNITED STATES PATENT OFFICE.

SAMUEL P. HALL AND JAMES W. WOOD, OF OAKLAND, CALIFORNIA.

BITUMINOUS-ROCK-REDUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 484,735, dated October 18, 1892.

Application filed April 1, 1892. Serial No. 427,426. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL P. HALL and JAMES W. WOOD, citizens of the United States, residing at Oakland, Alameda county, State of California, have invented an Improvement in Bituminous-Rock-Reducing Machines; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to a machine which is especially designed for pulverizing and preparing bituminous rock to be used upon streets and roadways and for the preparation of surfaces generally.

It consists in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section showing my invention. Fig. 2 is a transverse vertical section. Fig. 3 is an enlarged detail of one of the chambers.

The object of our invention is to provide an apparatus in which asphaltum in lumps is prepared and finally reduced, crumbled, and pulverized to a sufficient fineness to be employed in the preparation of various surfaces for which this material is used.

A A are two vertical frames properly supported at a considerable distance apart opposite to each other. These frames have chambers formed in them, as shown at B and C. The chamber B has a hopper or opening, through which material is fed into it from above. The chambers C communicate with each other by means of a vertical passage D, so that material arriving in one of the chambers C will drop into the one below it.

Between the chambers B and C of the two oppositely-placed frames A extend the tubular carriers E, which are preferably made of sufficiently-stout metal. Outside of these tubes are surrounding concentric casings F, leaving a sufficient space between the outer and inner tubes for the admission of steam, which passes into the outer jacket through any suitably-arranged pipe or pipes H, connected with a steam-generator. The ends of these tubes are fixed in the heads A, so as to make steam-tight joints, and the inner tube is continuous at each end with an opening leading into the chambers B and C. The outer ends of these chambers in the heads A are closed by caps I, having suitable stuffing-boxes J, and through these pass the hollow shafts K, extending from end to end and central within the inner tube. Suitable connections are made between the generator and these pipes to admit steam to heat the center of the mass. These shafts have the spiral blades L fixed to them and extending around them from end to end, as shown. The shafts are rotated by means of gears N, fixed to the ends of the shafts and having the teeth at a sufficient angle to cause them to mesh properly on account of the inclination of the tubes and the shafts K. The upper tube and spiral conveying-screw decline slightly from the receiving-chamber B to the delivery-chamber C, and it will be manifest that when the screw is in rotation material which is fed into the hopper at the upper chamber B will be slowly carried by the screw from one end to the other of the two, being subjected to the heat within the exterior casing and from the central hollow shaft, which gradually brings its temperature up to any required point. It will be manifest that steam of any degree of heat may be employed so as to raise the temperature of the material to the point required for its easy pulverizing. When the material reaches the chamber C, it will drop through the passage D into the corresponding chamber below. From this chamber the second jacketed tube E extends to the opposite head, being slightly inclined again, as shown, and a similar screw L in this tube returns the material to a chamber C in the first head and below the chamber B. From this chamber C the material drops through a passage D into another chamber C below, from which it is again returned to the second head A through a third inclined jacketed pipe by means of a conveyer. As many of these conveyer-tubes and conveyers may be employed as will be necessary to continue the material within the action of the heated atmosphere until it is raised to the proper temperature. This I assist by introducing into the upper hopper with the material hydrocarbon oil, preferably in an unrefined condition, which, being carried through the tubes and continuously stirred and intimately mixed with the bitumi-

nous rock, will permeate it and soften it, so that it will more readily crumble when it has reached the proper degree of heat.

We have found that in practice when bituminous rock is heated in a closed chamber and afterward taken out and carried to any point for use or to an apparatus for pulverizing or crushing it quickly becomes too hard for proper pulverizing after it leaves the heater. We have therefore shown the lowermost chamber C′, into which the rock is finally discharged by the last spiral conveyer, made of considerable size and having within it the transversely-journaled drums O, provided with radially-projecting pins P, which interlace or mesh with each other sufficiently to break up any particles of rock which pass between them. The bituminous rock is delivered from the lowest of the spirals L, so as to fall upon the top between these rollers, and the rollers are driven by a suitable connection, so as to carry the rock down between them and subject it to the action of the radial pins. The rock in this heated condition is very easily crumbled into small particles, which is the object of this apparatus. As it falls through between the pulverizing-rollers it is received in the lower part of the chamber C′ by a final conveying-screw, and is by this carried through the lower jacketed tube and discharged into the lower part of the head A, passing out through a discharge-passage Q, having a suitable gate R, which is opened whenever desired to allow the material to be taken out from time to time for use.

By this apparatus we are enabled to heat the material to any desired temperature which may be found necessary to bring it into proper condition to be easily pulverized and to mix with it such a quantity of oil as is necessary to add to it to assist in bringing about its proper condition. The material is retained within the apparatus until it is entirely pulverized, and is only discharged therefrom when it is required for use in preparing the surface.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The bituminous-rock apparatus comprising the vertical frames, each of which is formed with integral chambers with intermediate connecting-passage, the imperforate oppositely-inclined steam-jacketed tubes having their ends in line with the chambers and fitted thereto, so as to make steam-joints, a supply-hopper, spiral conveyers in said tubes for transferring the material from one tube to another, and means for rotating the conveyers, substantially as herein described.

2. The bituminous-rock apparatus comprising the series of oppositely-inclined tubes, the main frame having connecting-chambers in line with the ends of said tubes and receiving and supporting said ends, steam-jackets surrounding the tubes, having their ends fixed in said heads to form steam-tight joints, hollow axle-shafts in said tubes provided with spirally-disposed blades for conveying the material through the tubes, and steam-pipes for admitting steam into the interior of the shafts and into the casing outside of the tubes, substantially as herein described.

3. A bituminous-rock machine consisting of the oppositely-inclined steam-jacketed tubes, chambered heads within which the ends of these tubes are fixed, hollow axial shafts having spirally-arranged propeller-blades or conveyers by which the material is carried from end to end of the tubes, gears fixed upon the exterior ends of these shafts, through which power is derived to rotate the propellers and transport the material, and toothed pulverizing-rollers inclosed within a casing at the lower end of the machine and adapted to receive the material directly from the final conveyer and pulverize it before it is exposed to the open air, substantially as herein described.

4. In a bituminous-rock machine, a series of oppositely-inclined heated tubes, chambered heads within which the ends of the tubes terminate and through which the material is transferred from any tube to the succeeding one, means by which the material is moved from end to end of the tubes, and a device whereby oil is introduced into the tubes to be conveyed and mixed with the contents, substantially as herein described.

In witness whereof we have hereunto set our hands.

SAMUEL P. HALL.
JAMES W. WOOD.

Witnesses:
JOSEPH H. MCMASTER,
W. A. HALL.