A. P. DANIEL.

MACHINE FOR PREPARING PAVING MATERIALS.

APPLICATION FILED MAR. 14, 1919.

1,369,730.

Patented Feb. 22, 1921.

2 SHEETS—SHEET 1.

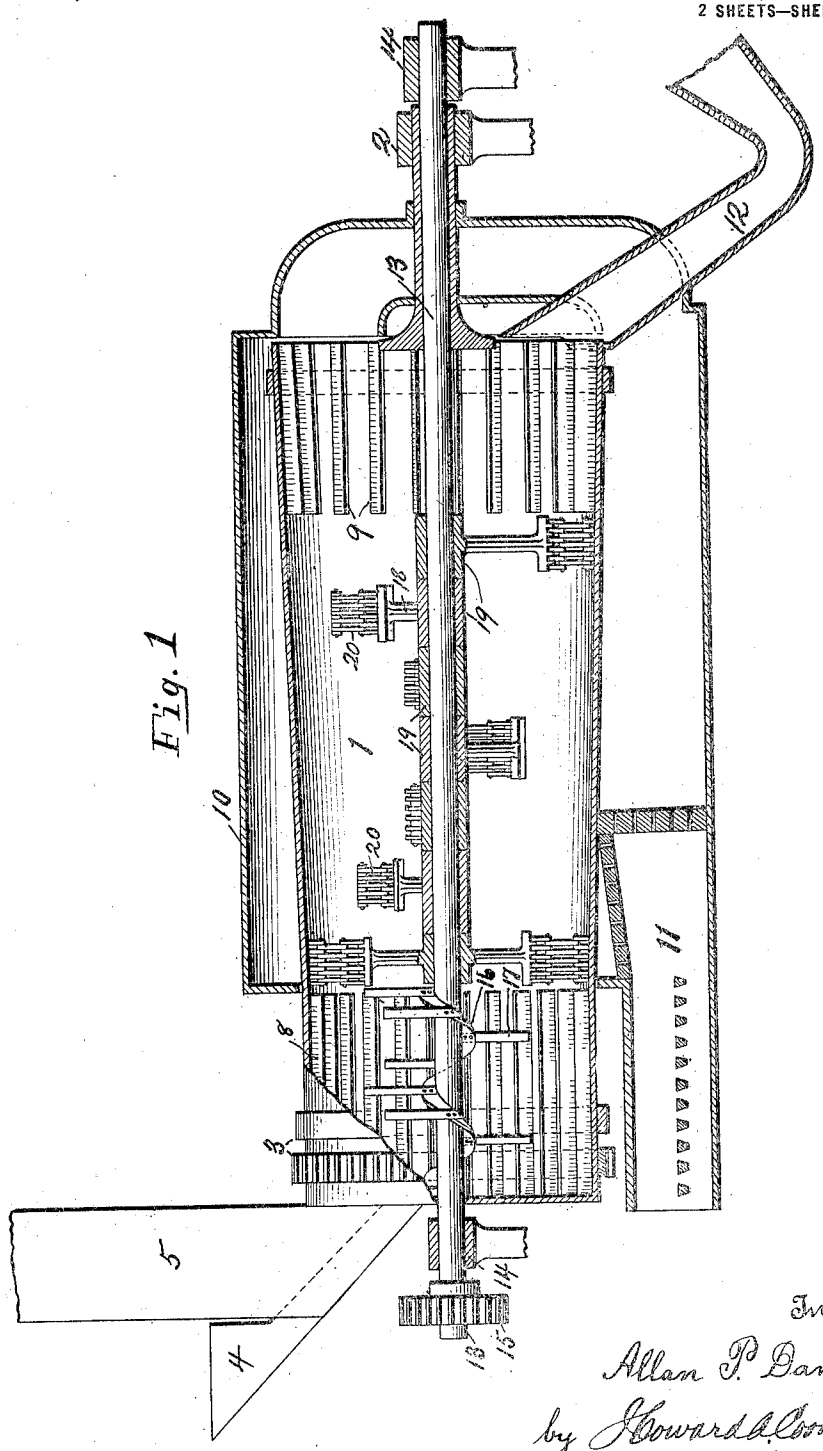


Fig. 1

Inventor

Allan P. Daniel

by Howard A. Coombs

his Attorney

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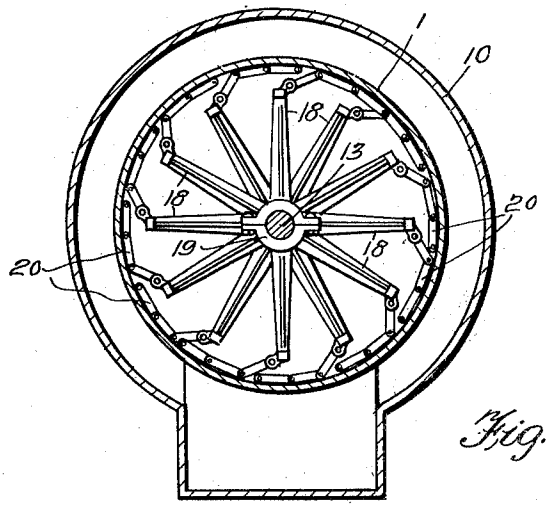


Fig. 2.

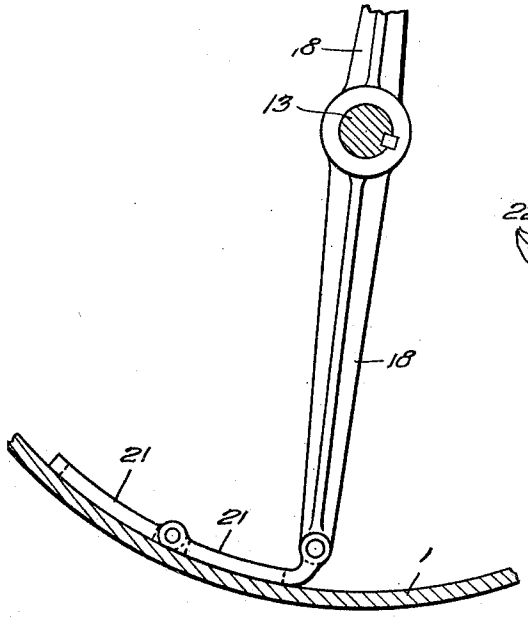


Fig. 3.

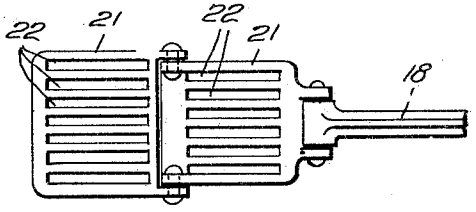


Fig. 4.

Inventor

Allan P. Daniel

By Howard A. Coombs

his Attorney

UNITED STATES PATENT OFFICE.

ALLAN P. DANIEL, OF AURORA, ILLINOIS, ASSIGNOR TO BITUMINIZED ROAD COMPANY, OF KANSAS CITY, MISSOURI, A CORPORATION OF ARIZONA.

MACHINE FOR PREPARING PAVING MATERIALS.

1,369,730. Specification of Letters Patent. Patented Feb. 22, 1921.

Application filed March 14, 1919. Serial No. 282,677.

To all whom it may concern:

Be it known that I, ALLAN P. DANIEL, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented new and useful Improvements in Machines for Preparing Paving Materials, of which the following is a specification.

My invention relates to the preparation of paving material of the kind described and claimed in the patents of M. A. Popkess, No. 1,008,433, issued November 14, 1911, and No. 1,220,682, issued March 27, 1917.

For the preparation of the earthy or clayey dust, or the stony dust, which forms the basis of the paving materials of the said patents, machines have hitherto been used comprising, essentially, a slowly rotating drum having lifting shelves and blades on its inner peripheral wall, and a rapidly rotating pulverizing reel within the said drum and carrying spirally arranged impact blades; and, in some cases, a separating screen cylinder carried by the drum between it and the pulverizer. Such machines form the subject-matter of the patents to M. A. Popkess, No. 1,062,552, issued May 20, 1913; No. 1,205,948, issued November 21, 1916, and No. 1,240,481, issued September 18, 1917.

I have found that, in practice, at least as good results can be obtained by other and simpler means, than required for the impact method, whereby the first cost and the expense of operation of the machine can be very materially reduced.

Whereas, heretofore, it was believed essential, in order to obtain the fine degree of pulverization of the material, to subject the same to violent blows or impacts, I have discovered that a grinding or attrition action serves equally as well, if not better, which action is the result of the combination of means hereinafter described and claimed, by the use of which the weight of the moving parts is greatly lessened and the power required to run the machine is much reduced.

This machine is illustrated in the accompanying drawing, in which

Figure 1 is a longitudinal central section through the machine, Fig. 2 is a central cross section of the machine; Fig. 3 is a side elevation of a modified form of one of the comminuting elements, and Fig. 4 is a face view of the same.

The machine comprises a drum 1, supported at one end in a bearing 2, and supported and rotated at the other end by the annular track and girth gear 3, which is driven from any suitable source of power. A chute 4 leads into the front end of said drum and a stack 5 is also connected thereto. The drum is cylindrical for a portion of its length and then is slightly divergently tapered to the rear end. The cylindrical portion contains lifting shelves 8, and the rear end of the tapered portion, as shown, contains or may contain similar shelves 9. The drum is inclosed in a hood or casing 10, which is connected with a furnace 11 and communicates with the rear end of the drum. The latter has an opening to permit the comminuted material to be discharged into an elevator boot 12. Since the object of tapering the drum is to gradually feed the material through it, its axis will be inclined downwardly toward its rear end, if the drum is cylindrical, throughout its length. A shaft 13, mounted in bearings 14 and driven by sprocket or gear wheel 15, runs axially through the drum, and carries, for that portion of its length contained within said cylindrical portion of the drum, a worm or spiral conveyer 16 and disintegrating blades 17, the arrangement being such that the coarse material will be fed rearwardly while being broken up.

The remaining portion of the shaft within the drum, or up to where the lifting shelves 9 commence, is equipped with a plurality of collars 19, each carrying radial spider arms 18 which, in turn, have secured to them the flexible comminuting elements which, as shown in Figs. 1 and 2, consist of a plurality of sets of chain links 20. The length of these chains is such that their free ends wipe against, or slide over, the inside wall of the drum when the shaft is revolved; in a machine now operating the chains drag on the drum for about 8 inches of their length. One set of these chain links is pivoted to the end of the arm 18 and other set, or sets, to the end of the first or preceding set. As shown in Figs. 3 and 4, solid shoes 21, provided with open slots 22

and pivoted, like the chain links, to the ends of the arms and of the preceding shoes, may be used.

Each collar 17 carries four of said arms 18, which are set slightly in advance of the arms on the next preceding collar. The purpose of the lifting shelves 9 in the rear end of the drum is to cascade the fine dust, retarding its exit from the drum, whereby its temperature is raised and any remaining moisture evaporated, but I do not regard the provision of said blades as a necessarily essential feature of the machine.

The heated gases from the furnace pass up and around the drum in the hood 10, and enter the drum at its rear end, finally escaping through the stack 5. The shaft being rotated faster than the drum, the material is carried up on the wall of the latter and distributed in a thin film-like layer by the chains, which pulverize it by a grinding or attrition action, the material being slowly fed rearwardly owing to the conical shape or inclined position of the drum, the comminuting action being assisted by the heat. From the elevator boot 12, the material may be conveyed to a mixer, as in the said machine patents of M. A. Popkess, in which it is combined with the proper proportion of asphalt or bitumen to produce the paving materials of the said process and product patents of M. A. Popkess.

What I claim is:

1. A machine for preparing paving material, comprising a divergently tapering drum, means to rotate the same, means to introduce thereinto the material to be comminuted, a shaft mounted coaxially with said drum, means to rotate said shaft faster than said drum, breaker blades on the front portion of said shaft, spider arms on the rear portion of the same, and chains secured to the ends of said arms of such length that they drag on the drum wall.

2. A machine for preparing paving material, comprising a rotary drum, lifting shelves secured within said drum in its front end, similar shelves within the rear end of said drum, an independently rotatable shaft running through said drum, a spiral conveyer and breaker blades carried by said shaft and extending for a distance thereon equal to the length of said first mentioned shelves, chains secured to said shaft throughout the center portion of said drum between those portions which carry said shelves and adapted to slide on the drum surface, and means to heat said drum internally and externally.

3. A machine for preparing paving material, comprising a rotary drum, an independently rotatable shaft extending axially therethrough, a casing surrounding said drum and opening into its rear end, a furnace beneath the front end of said drum and communicating with said casing, means on said shaft in the front end of said drum to break the material introduced thereinto into relatively small particles and to feed them rearwardly in the drum, means on said shaft in the central portion of said drum adapted to be thrown outwardly by centrifugal force against the wall of the drum to comminute said particles to dust by a grinding or attrition action, and means in the rear portion of said drum to cascade said dust and permit the heat entering the rear end of the drum to remove any remaining moisture.

4. A machine for preparing paving material, comprising a rotary drum, an independently rotatable shaft extending axially therethrough, means on said shaft in the front end of said drum to break the material introduced thereinto into relatively small particles and to feed them rearwardly in the drum, and means on said shaft in the central portion of said drum adapted to be thrown outwardly by centrifugal force against the wall of the drum to comminute said particles to dust by a grinding or attrition action.

5. A machine for preparing paving material, comprising a rotary drum, means to feed coarse material into the same, a shaft running axially through said drum, means to rotate said shaft, staggered radial arms carried by said shaft, a comminuting element pivotally connected to the end of each arm, a similar element pivotally connected to said first element, and means to heat said drum internally and externally.

6. In a machine for pulverizing earthy material or the like, the combination with a rotatable drum and an independently rotatable shaft journaled axially therein, of a plurality of radial arms carried by said shaft, and a wide and flat comminuting element linked to the end of each arm, so that it will slide on the drum as the shaft is rotated.

7. In a machine for pulverizing earthy material or the like, the combination with a rotatable drum and an independently rapidly rotatable shaft running therethrough, of a plurality of radial arms carried by said shaft, and a wide and flat comminuting element flexibly connected to the end of each arm.

8. In a machine for pulverizing earthy material or the like, the combination with a rotatable drum and an independently rotatable shaft axially mounted therein, of staggered radial arms secured to said shaft, and a flexible linked comminuting element pivoted to the end of each arm.

9. In a machine for pulverizing earthy material or the like, the combination with a rotatable drum and an independently rotatable shaft running axially therethrough, of

a plurality of rigid arms mounted on said shaft and extending to within a short distance of the wall of said drum, a relatively wide and flat comminuting element adapted to slide on the drum wall as the shaft is rotated, and link connections between each arm and one of said elements.

10. In a machine for comminuting earthy material or the like, the combination with a rotatable drum and an independently rotatable shaft axially journaled therein, of a plurality of rigid arms projecting radially from said shaft and extending to within a short distance from the wall of the drum, and a flexible comminuting element pivoted to the end of each arm and arranged to slide on the wall of the drum as the shaft rotates.

11. In a machine for pulverizing earthy material or the like, the combination with a rotatable drum and an independently rotatable shaft running axially therethrough, of a plurality of rigid arms carried by said shaft, and a comminuting element flexibly connected to the end of each arm, said elements consisting of a plurality of parallel links.

12. In a machine for pulverizing earthy material or the like, the combination with a rotatable drum and an independently rotatable shaft journaled axially therein, of staggered radial arms secured to said shaft and extending for the greater part of the distance between said shaft and the wall of the drum, and a comminuting element of considerable superficial area flexibly connected to the end of each arm and arranged to slide on the wall of the drum as the shaft is rotated.

In testimony whereof I have hereunto set my hand.

ALLAN P. DANIEL.