

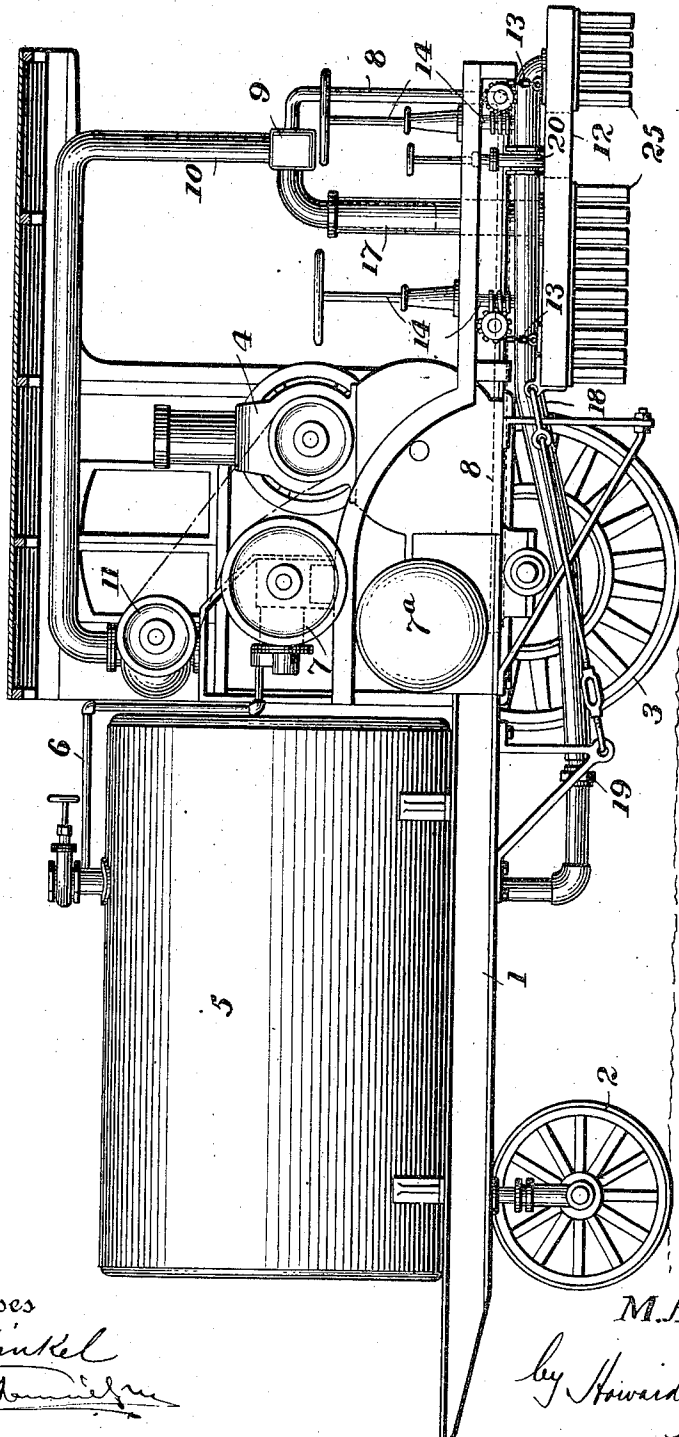
M. A. POPKESS.
ROAD MAKING MACHINE.
APPLICATION FILED JAN. 31, 1910.

1,013,512.

Patented Jan. 2, 1912.

3 SHEETS-SHEET 1.

Fig. 1



Witnesses

J. G. Stinkel
James M. M. M. M.

Inventor
M. A. Popkess

by Howard A. Coombs
his Attorney

M. A. POPKESS.
ROAD MAKING MACHINE.
APPLICATION FILED JAN. 31, 1910.

1,013,512.

Patented Jan. 2, 1912.

3 SHEETS-SHEET 2.

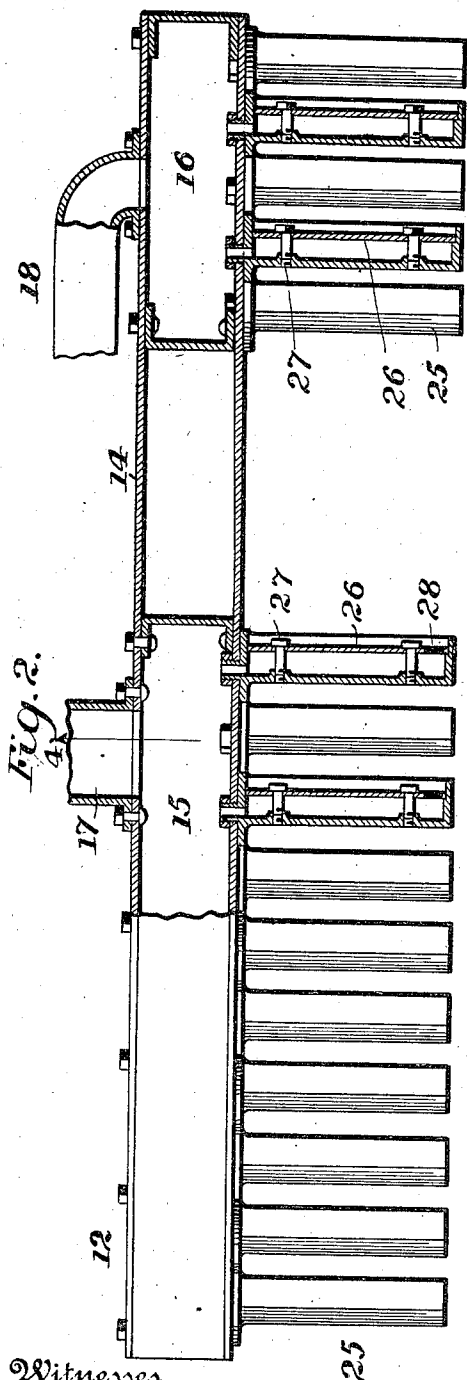


Fig. 2.

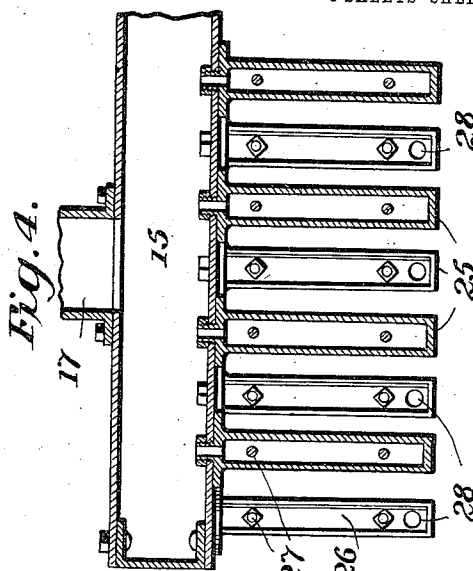
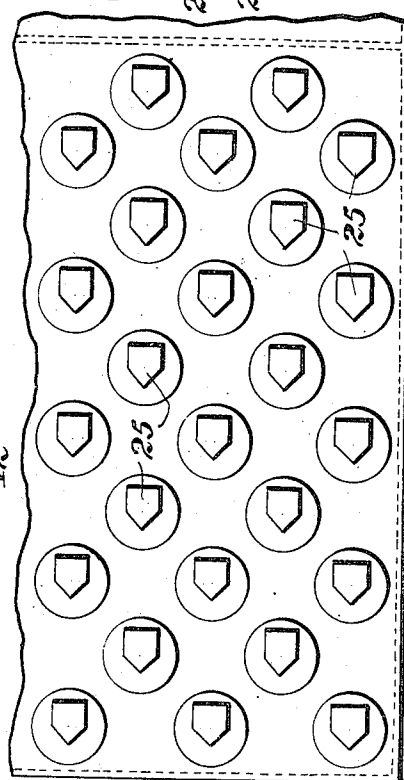


Fig. 4.

Fig. 3.



Witnesses
Jepstink
Orville Rimey

Inventor
M.A. Popkess
by *Howard A. Coombe*
his Attorney

1,013,512.

Patented Jan. 2, 1912.
3 SHEETS—SHEET 3.

Fig. 5.

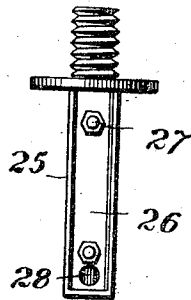


Fig. 6.

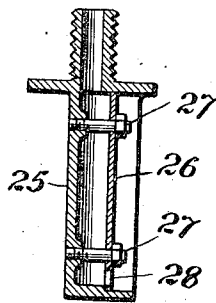


Fig. 7.

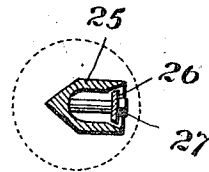


Fig. 8.

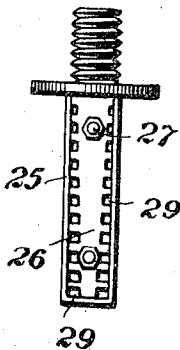


Fig. 9.

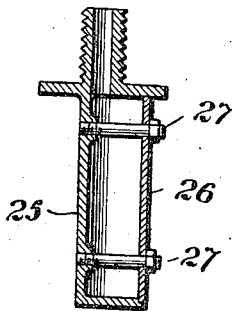


Fig. 10.

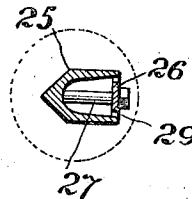
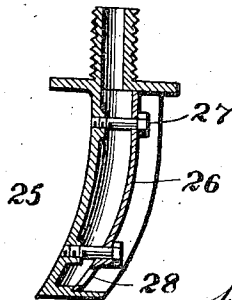


Fig. 11.



Witnesses

J. G. Stunkel
Amie R. Stunkel

Inventor
M. A. Popkess

by *Howard A. Crumley*
his Attorney

UNITED STATES PATENT OFFICE.

MICHAEL A. POPKESS, OF KANSAS CITY, MISSOURI.

ROAD-MAKING MACHINE.

1,013,512.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed January 31, 1910. Serial No. 540,993.

To all whom it may concern:

Be it known that I, MICHAEL A. POPKESS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Road-Making Machines, of which the following is a specification.

This invention relates to road-making machinery and consists more particularly in a machine adapted to travel over the surface of the roadway to be treated and to inject a liquid binder below the surface, means being also provided to preliminarily heat the earthy material, if necessary, by injecting into it below the surface, a blast of flame and air.

The construction and operation of the machine will be made clear in the following description in connection with the accompanying three sheets of drawings, in which—

Figure 1 is a side elevation of a machine constructed and adapted for the purposes mentioned. Fig. 2 is a side view and partial longitudinal section of the means whereby the heat and the binder are applied or injected below the surface of the roadway. Fig. 3 is a partial underneath plan view of the same. Fig. 4 is a partial cross-section of the same, taken on the line 4—4 of Fig. 2. Figs. 5 to 11 inclusive are detail views of the different forms of teeth through which the flame and binder respectively, are injected into the earth below the surface.

While I have shown in Fig. 1 an automobile vehicle equipped with all the necessary means for performing the work desired, it must be understood that the main features of my invention are capable of use separately, as will appear clearly hereinafter.

The machine of Fig. 1 comprises a suitable frames 1, front steering-wheels 2 and rear driving-wheels 3, the latter being operatively connected to an engine 4, carried on the frame. 5 represents the storage-tank for the liquid binder, which may be asphalt or any other suitable bituminous substance, and 6 represents a pipe for leading compressed-air into said tank from a compressor 7, driven by the engine 4. 7^a is a gasoline-tank, connected by a pipe 8 to a mixer 9, into which compressed-air is also led through a pipe 10, from a blower 11, also

driven by the engine 4. 12 represents a hollow header, rectangular in shape and built up of plates and channel-irons, the same being suspended from the frame by chains 13, connected to hoisting-gear 14, whereby said header can be raised, as shown in Fig. 1, or lowered down onto the ground into operative position. The header 12 is divided into two compartments 15 and 16, see Fig. 2, into the former of which opens a telescopic tube 17, leading from the gasoline and air mixer 9, and into the compartment 16 opens a tube 18, leading from the binder-tank 5, said tube 18 having a flexible joint 19, to enable it to follow the vertical adjustments of the header 14, and a valve 20 to control the flow of binder to the header. Air-pipe 10 and gasoline-pipe 8 may also be provided with valves, if desired, or the control of the combustible mixture may be in the mixer 9, by any suitable, well-known means. Communicating with the interior of the header compartments 15 and 16 and projecting downwardly therefrom are a series of hollow harrow-teeth 25, wedge-shape in cross-section at the front, and provided with apertures opening rearwardly for the issuance of the flame or the binder, as the case may be, into the earth. These teeth may be straight, as shown in Figs. 1 to 10, or curved, as shown in Fig. 11. The rear side of each tooth is open and is closed by a plate 26, secured between the U-shaped walls of the tooth by bolts 27, and provided with a passage or passages, as will now be described.

Referring to Figs. 4 to 6 and 11, the tooth therein shown is the one through which the flame is directed into the earth from compartment 15, and the closing plate 26 has an aperture 28 near its lower end for that purpose, it being desirable to inject the flame as far beneath the surface as possible. The tooth shown in Figs. 7 to 10 is the one through which the binder is injected from the compartment 16, and the closing plate 26 is either constructed with a series of lateral apertures or notches 29 for the passage of the binder, which apertures, as shown in Fig. 8, may increase in size progressively from the top of the tooth to the bottom, or else said plate 26 is made of less width than the outer part of the space between the side walls of the tooth, so that a vertical slot is left on each side of said plate for

the passage of the binder, as shown in Fig. 7. This construction has the advantage of adjustability of the size of the outlets for the binder, since by screwing the bolts 27 in more or less, the slots between the sides of the tooth and of the closing-plate can be varied in width. In this case also, if desired, the slots may be wider toward the bottom of the tooth than at the top; the reason for such construction being the fact that the binder, as soon as it is injected into the earth, tends to rise and, consequently it may be desirable to inject a greater quantity of the binder at the deepest point of the tooth than near the surface.

In operation, the surface to be treated must usually be first plowed and harrowed and large stones removed, the machine being then caused to travel over such prepared surface, with the header lowered into contact with the surface and the teeth penetrating into the earth. It is not always necessary to heat the road material before injecting the binder, as, for instance, where the material is hot, dry sand and the binder is itself heated, but the heating is desirable with most kinds of surface material, as it drives off the moisture and enables the binder to thoroughly permeate and mix with the earth before congealing.

In Fig. 1, I have shown a larger number of rows of teeth for heating than for injecting the binder, it being highly desirable, where the earth is moist, to drive off as much moisture as possible before injecting the binder. The reason for the gap or space between the rows of heater teeth and of binder teeth, is to avoid overheating or burning the binder. The flat bottom of the header prevents access of cold air to the heated earth and the result is a thorough intermixing of the earth and binder, whereby a hard, dustless and durable road-surface is produced. The weight of the header serves to compact and smooth the surface, but, of course, it may be subsequently rolled.

The essence of my invention is the means by which the binder is caused to penetrate the heated and dried earth at a considerable distance below the surface, it having been found by experience that sprinkling the binder upon the surface and subsequently attempting to work it down into the earth does not give satisfactory durability to the roadway, under the present conditions of high-speed travel.

Having thus described my invention, what I claim is:—

1. A machine for the purpose described, comprising a header adapted to be moved along in contact with the surface, a plurality of hollow teeth depending below said header and means to eject a liquid binder from the rear side of said teeth.

2. A machine for the purpose described,

comprising a header adapted to be moved along in contact with the surface, a plurality of hollow teeth depending below said header and means to inject a flame into the earth from the rear side of certain of said teeth and means to inject a binder into the earth from the rear side of the other teeth.

3. A machine for the purpose described, comprising a hollow header provided with means whereby it may be moved along in contact with the surface, a plurality of staggered rows of hollow teeth depending from and communicating with the interior of said header, said teeth being wedge-shaped in front and provided with openings in the rear, and means to force a liquid binder into said header and teeth.

4. A machine for the purpose described, comprising a hollow header provided with means whereby it may be moved along in contact with the surface, a plurality of staggered rows of hollow teeth depending from and communicating with the interior of said header, the latter comprising two compartments, one in front of the other, certain of said rows of teeth opening into one of said compartments and other of said rows into the other compartment, means to supply a combustible mixture into the front one of said compartments, and means to supply a liquid binder into the other of said compartments.

5. In a machine of the class described, a harrow-tooth for injecting a binder below the surface, the same being substantially U-shaped in cross-section, a closing-plate mounted between the side walls of said tooth and means to secure said plate to the tooth, openings being provided between said plate and said side walls for the passage of the binder.

6. In a machine of the class described, the combination with a plurality of hollow harrow-teeth provided with apertures in the lower ends of the rear sides and means to supply a combustible mixture of air and gas thereto, of a plurality of similar teeth arranged in the rear of said first teeth and having vertical slots or apertures in their rear sides and means to supply a liquid binder under pressure thereto.

7. A machine for surfacing roadways, comprising a wheeled frame, a tank for a liquid binder thereon, means to supply air under pressure to said tank, a plurality of hollow harrow teeth depending from and vertically adjustable on said frame, a pipe leading from said tank to said teeth, additional hollow harrow teeth similarly supported in front of said first-mentioned teeth and means carried by the frame to supply a mixture of air and gas to said additional teeth.

8. A machine for surfacing roadways, comprising a plurality of hollow harrow

teeth, provided with rear openings near their lower ends, and means to force a combustible mixture of air and gas into said teeth.

9. A machine for surfacing roadways, comprising a hollow header adapted to be moved along in contact with the surface, a plurality of hollow teeth depending from said header and communicating therewith, means to inject a flame into the earth from certain of said teeth and means to inject a

binder into the earth from others of said teeth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MICHAEL A. POPKESS.

Witnesses:

J. EDGAR BLACK,
R. BEST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."