

(No Model.)

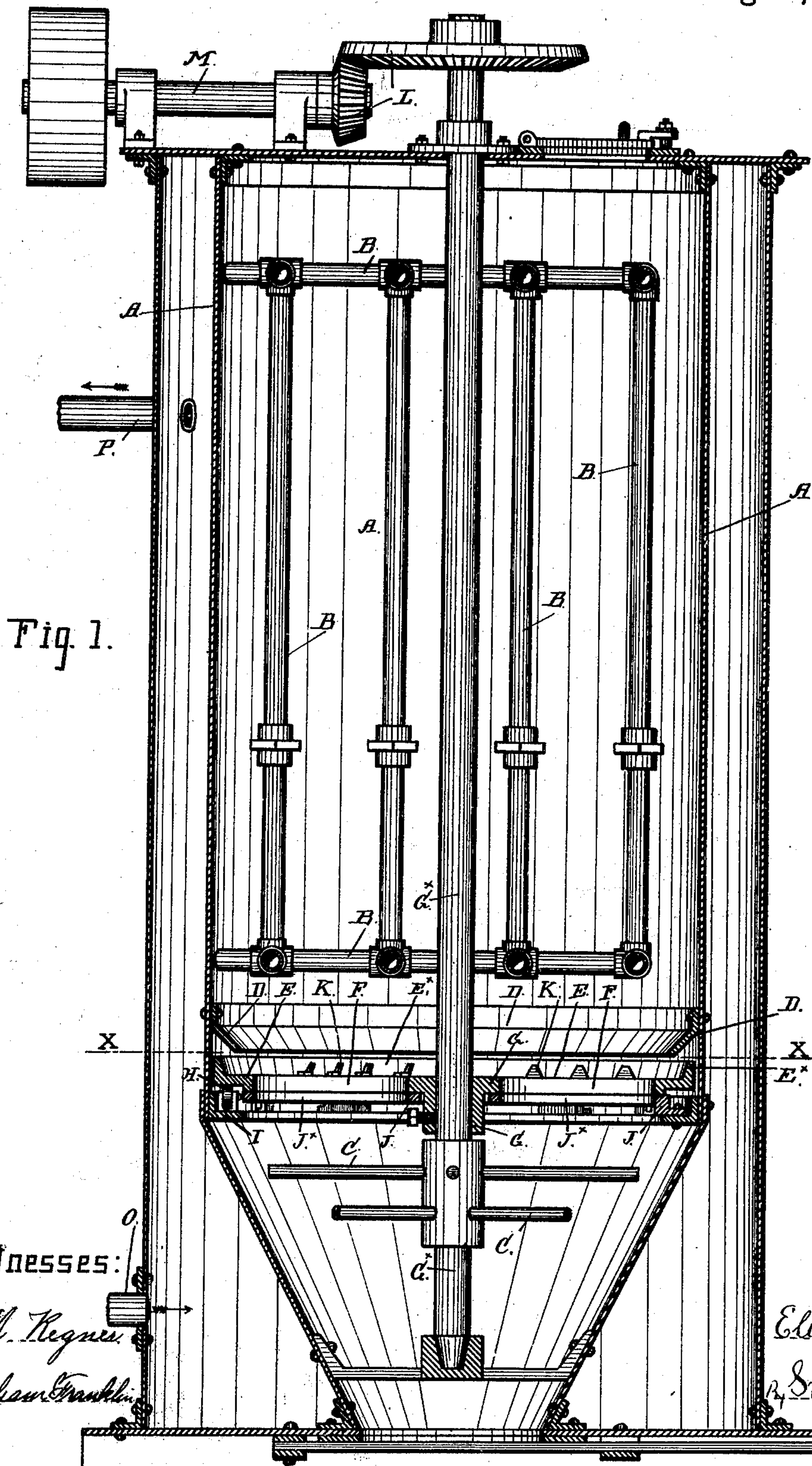
2 Sheets—Sheet 1.

E. GROAT.

MACHINE FOR REDUCING AND SOFTENING BITUMINOUS ROCK.

No. 502,417.

Patented Aug. 1, 1893.



(No Model.)

2 Sheets—Sheet 2.

E. GROAT.  
MACHINE FOR REDUCING AND SOFTENING BITUMINOUS ROCK.  
No. 502,417.  
Patented Aug. 1, 1893.

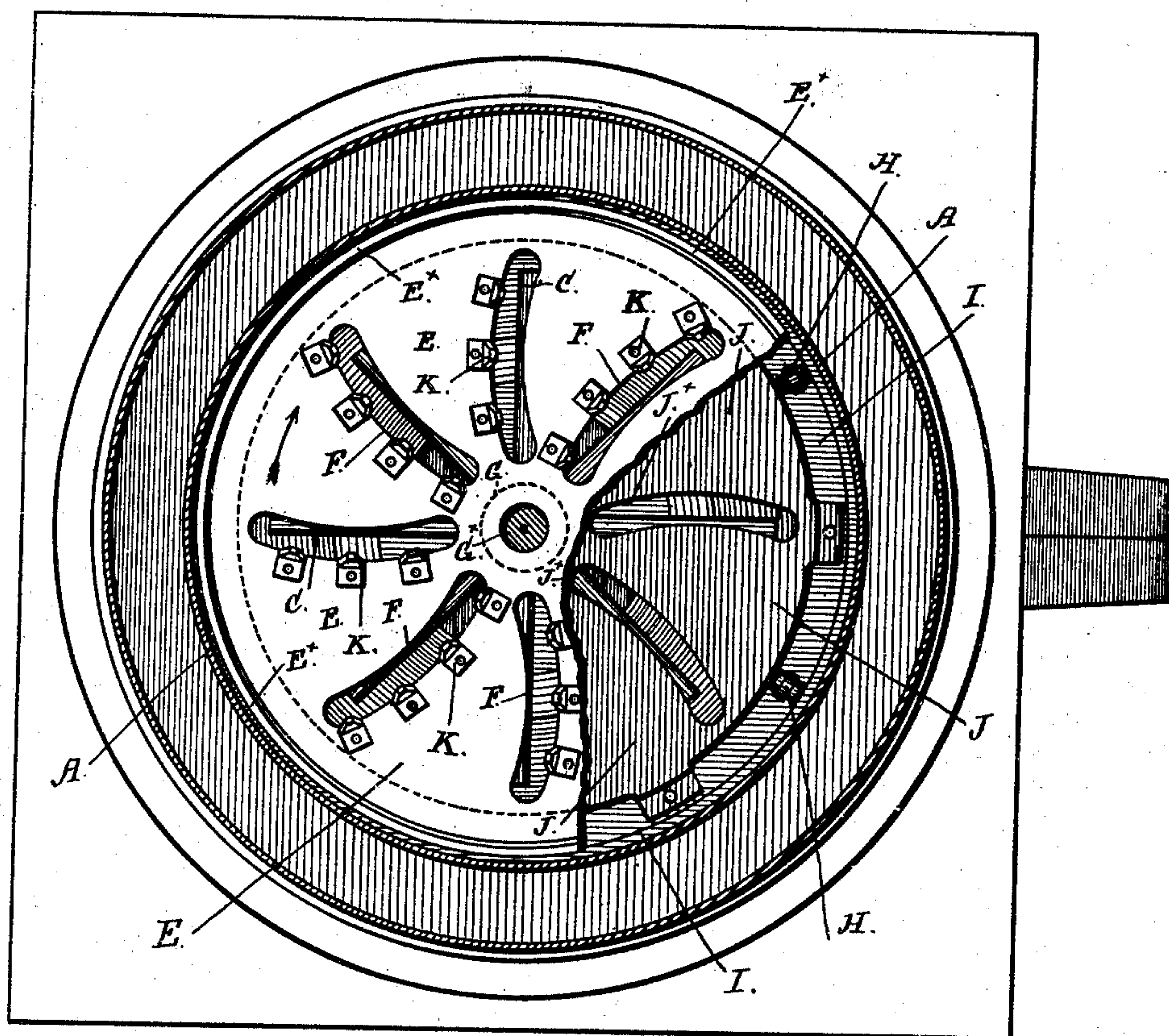


Fig. 2.

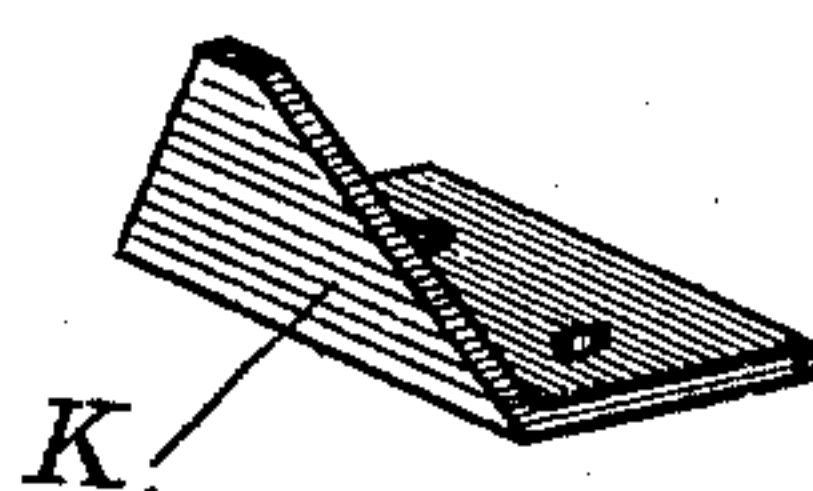


Fig. 3.

Witnesses:

*M. Regner*

*William Franklin*

Inventor:

*Elias Groat*

*By Smit & Osborn*

*Attys.*



# UNITED STATES PATENT OFFICE.

ELIAS GROAT, OF SAN LUIS OBISPO, CALIFORNIA.

## MACHINE FOR REDUCING AND SOFTENING BITUMINOUS ROCK.

SPECIFICATION forming part of Letters Patent No. 502,417, dated August 1, 1893.

Application filed August 31, 1892. Serial No. 444,625. (No model.)

*To all whom it may concern:*

Be it known that I, ELIAS GROAT, a citizen of the United States, residing at San Luis Obispo, in the county of San Luis Obispo and State of California, have invented certain new and useful Improvements in Machines for Reducing and Softening Bituminous Rock, of which the following is a specification.

My present invention relates to improvements made in machines for melting and reducing bituminous rock or other similar material of that class or description for which I made application for Letters Patent of the United States on March 25, 1892, Serial No. 426,336.

The improvements comprise certain construction and combination of parts producing an improved portable apparatus or machine for intimately mixing the constituents and bringing the material into a suitable soft and disintegrated condition for making roadways by the aid of steam alone which does not come in direct contact with the rock or material under treatment, all as herein fully set forth.

Referring to the accompanying drawings which form part of this specification:—Figure 1 is a vertical section of my machine for reducing and mixing bituminous rock. Fig. 2 is a horizontal section taken through line *xx* Fig. 1. Fig. 3 is a perspective view of the disintegrating teeth.

The upright steam jacketed cylinder or tank A with conical base, the rectangular stack of steam-pipe B connected with the steam-jacket, the stirrers or mixers C, C, and means for discharging the prepared bituminous rock from the base of the tank are all constructed substantially in the same manner as described in my former application for a patent.

It is a well conceded fact that in bituminous formations of the character above mentioned and in the same strata will be found deposits of variable richness in bituminous matter, say from five per cent. to twenty per cent. and when the prepared rock is not thoroughly mixed or incorporated in the process of reduction and laid upon the street as a pavement it will become soft in spots by the action of the sun's rays upon it, or the bond in other places will be easily broken or disintegrated by reason of such inequality in the reduction of the material so laid and the pave-

ment soon becomes worthless. Hence the object of my present invention is mainly to intimately mix the constituents which compose bituminous rock so as to bring it to a more uniform condition than has heretofore been attained. With this end in view I connect to the interior of the jacket a little beneath the stack of pipes of the reducing cylinder or tank an annular border or rim D with sides sloping inwardly in such a manner as to direct the material under treatment away from the face of the jacket or interior of shell at that point and cause it to pass more directly upon the face of the disintegrating plate or disk beneath. The disintegrating plate is composed of a circular disk-plate E having a rim or border  $E^x$  and radiating and curved openings or slots F, F, F, in the plate through which the reduced material passes to the stirrers beneath. It is provided with a hub or collar G and is keyed to the vertical shaft  $G^x$  which carries the stirrers in the conical end of the reducing tank and rotated by the shaft upon friction rollers or travelers H, H, fixed to the face of an annular track or plate I the edge of the rim or plate being also fixed to the interior of the shell or jacket of the tank. A base plate J is fixed directly underneath the rotating plate E and of the same diameter. It is also provided with slots or openings  $J^x J^x$  which correspond in curvature and dimensions with the rotary plate by which the flow of material is stopped and prevented from passing down into the conical chamber of the tank when operation of the machine ceases for the night; and in operation the arms of the rotating plate will shut over the slots in the fixed plate underneath and close up the apertures therein and prevent the flow or passage of any liquid or semi-solid portion of the charge contained in the reduction tank to the chamber beneath.

To one side of the apertures or slots of the rotating disk I connect by means of rivets or bolts the curved and beveled teeth K, K, K. They are upwardly inclined at an angle of about forty degrees and engage with the material softened by heat from the steam-jacket and tear or separate it into fragments to such a consistency that it will readily pass through the apertures of the disk and downward into the conical chamber to be further engaged by



the mixers or stirrers beneath, and be discharged from the conical chamber through the sliding gates in a fit condition for spreading upon the street to form the pavement.

- 5 The material is fed to the reducing tank or cylinder through an opening in the top provided with a trap door, and a vertical spindle or shaft is operated by means of the beveled gears L and a pulley on the horizontal shaft M.
- 10 Steam is admitted to the jacketed cylinder from a boiler in the usual way or through a pipe O and the excess of steam is taken through the pipe that taps the cylinder at P and is directed through a pipe to a donkey
- 15 engine (not shown) for driving the mixing shaft G<sup>x</sup> carrying the mixers and disintegrators. By this construction the machine will be self-feeding as the material or rock will pass downward by its own specific gravity on
- 20 to the rotating plate and as disintegration takes place will pass into the conical chamber without mechanical aid.

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

- 25 1. In an apparatus for reducing and softening bituminous rock, the combination with a tank, of a vertical shaft journaled in suitable bearings in said tank, a steam stack secured thereto, a rotating horizontal dish
- 30 shaped plate secured to said shaft and having curved slots therein, an annular deflecting plate secured to the interior of the tank above the rotating plate, rollers for carrying the said
- 35 plate and the mixers secured to the said shaft below the rotary plate all constructed and arranged in the manner and for the purpose set forth.

- 40 2. In an apparatus for reducing and softening bituminous rock the combination with the interior of the tank or cylinder, of a rotary horizontal dish shaped plate, radially

disposed curved slots therein, removable disintegrating teeth or arms secured along the line of said slots, an annular track or way 45 beneath said plate, the friction rollers secured to the face of said track the mixers beneath said plate and the vertical shaft for supporting said plate and mixers, substantially in the manner and for the purpose set forth. 50

3. The combination with the interior of a tank or cylinder for reducing and softening bituminous rock, of a rotating horizontal dish shaped plate, radially disposed curved slots therein, and disintegrating teeth or arms along 55 the line of the said slots, as and for the purpose set forth.

4. In an apparatus for reducing and softening bituminous rock, the combination with a rotating horizontal disk or plate, a flange 60 on the outer circumference thereof, radially disposed curved slots in said disk or plate and disintegrating teeth or arms along the line of said slots, of an annular track secured to the interior of the reducing tank, and travelers 65 or friction rollers therein for carrying and supporting the rotary plate, as and for the purpose set forth.

5. In an apparatus for reducing and softening bituminous rock, the combination with 70 a rotating horizontal disk or plate, a flange on the outer circumference thereof, radially disposed curved slots in said disk or plate and disintegrating teeth or arms along the line of said slots, of an annular deflecting plate or 75 rim secured to the interior of the reducing tank above the rotating plate, as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

ELIAS GROAT. [L. S.]

Witnesses:

C. W. M. SMITH,  
LEE D. CRAIG.