

(No Model.)

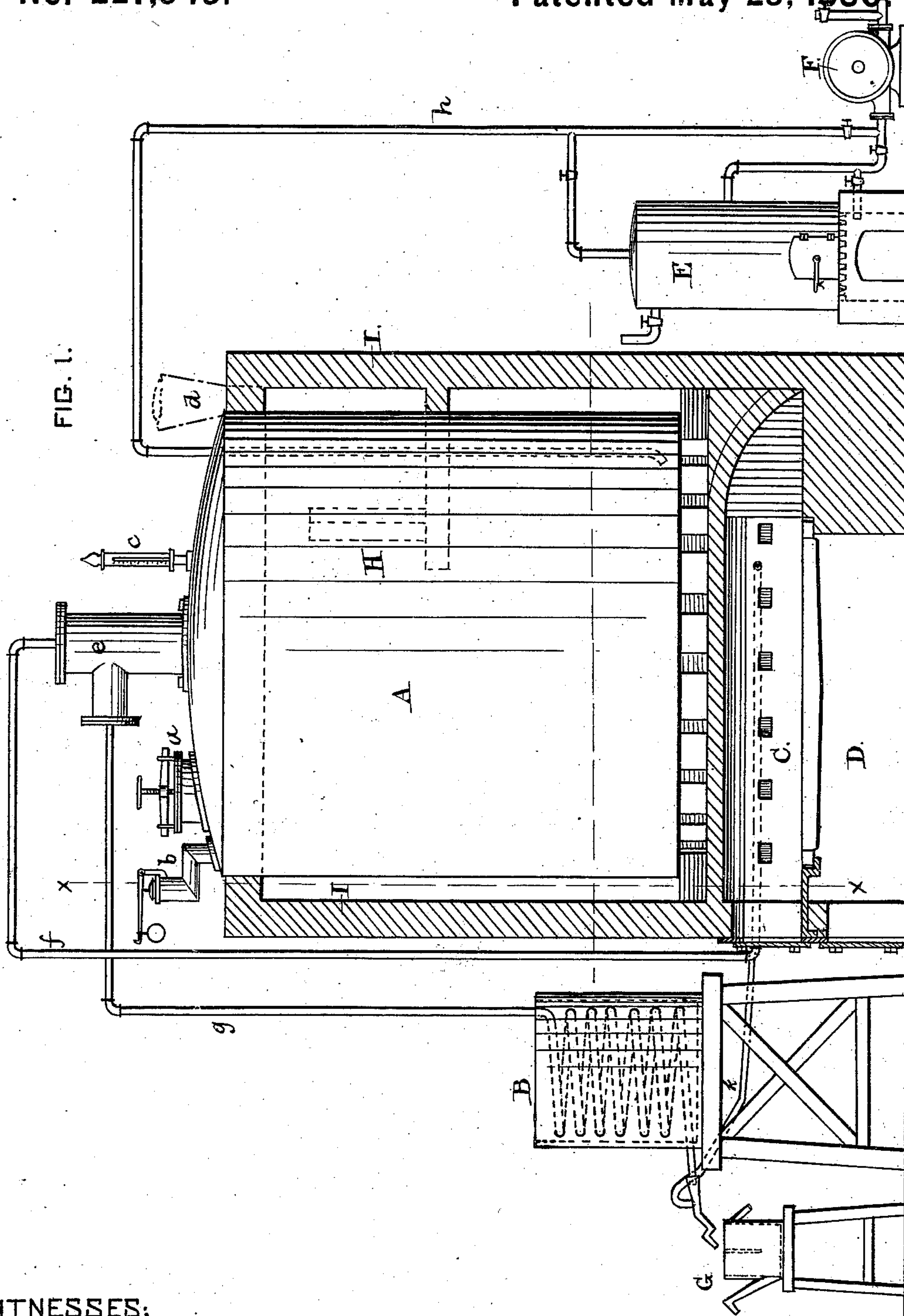
2 Sheets—Sheet 1.

D. W. BAILEY.

Process of and Apparatus for Reducing Asphaltum to a Liquid.

No. 227,945.

Patented May 25, 1880.



WITNESSES:

J. S. M. L. in
Geo W Downey

INVENTOR

D. W. Bailey

(No Model.)

2 Sheets—Sheet 2

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FIG. II.

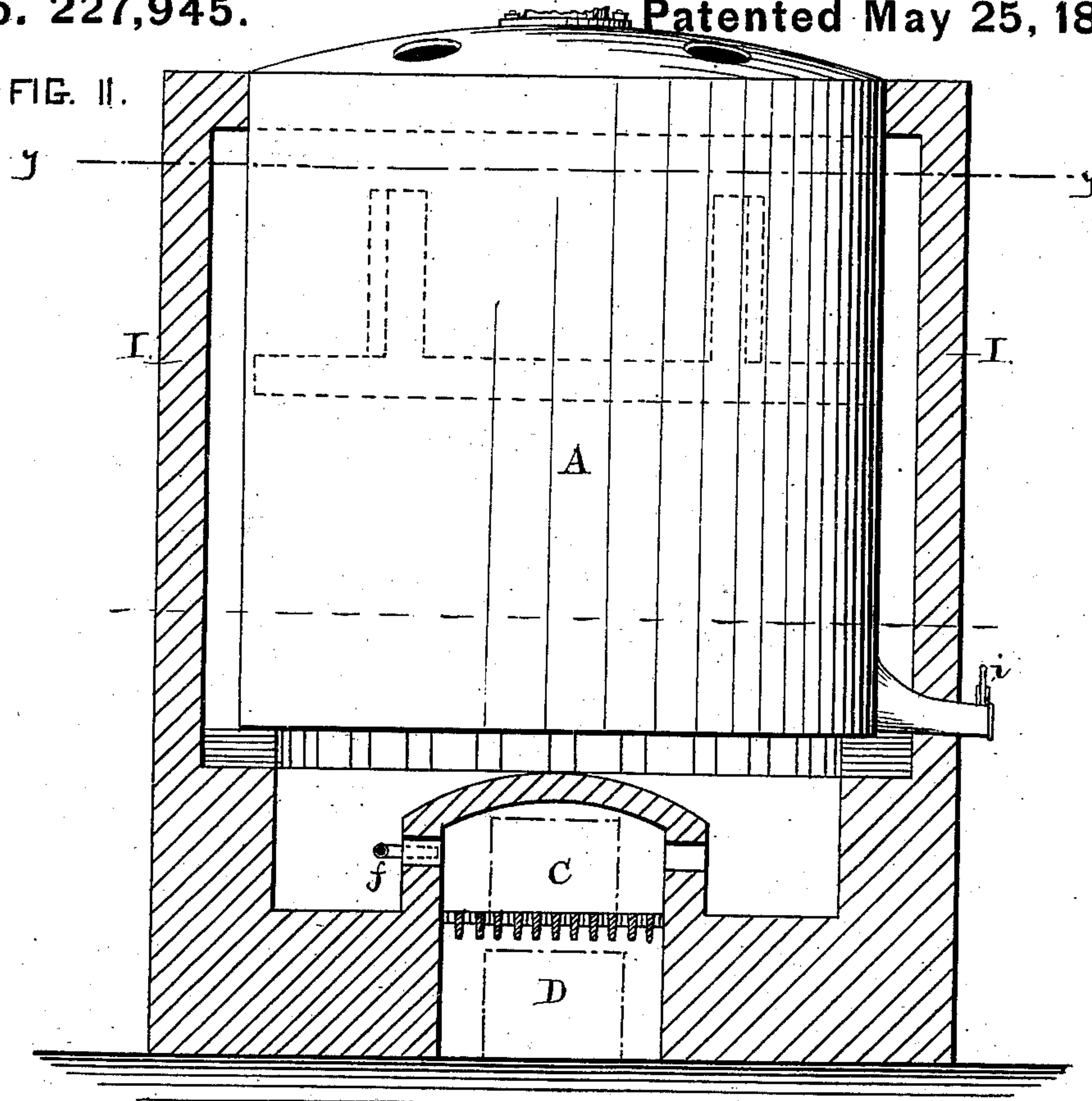
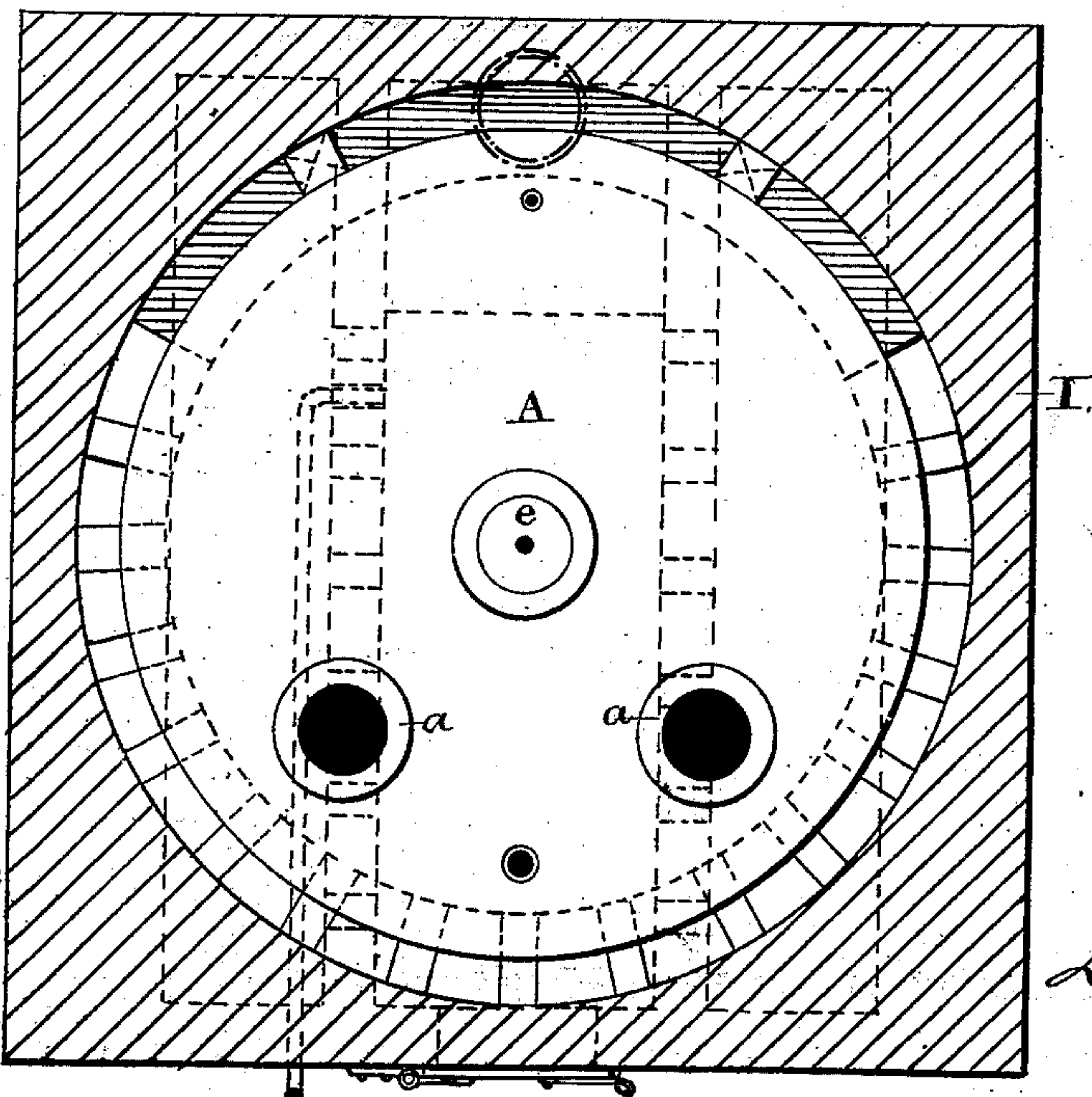


FIG. III.



WITNESSES:

J. S. McLean
Geo W Downing

INVENTOR

D. W. Bailey

UNITED STATES PATENT OFFICE.

DAVIS W. BAILEY, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
OF ONE-HALF OF HIS RIGHT TO JAMES McLAIN, OF SAME PLACE.

PROCESS OF AND APPARATUS FOR REDUCING ASPHALTUM TO A LIQUID.

SPECIFICATION forming part of Letters Patent No. 227,945, dated May 25, 1880.

Application filed April 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, DAVIS W. BAILEY, of Washington, District of Columbia, have invented a new and useful Improvement in the Process and Apparatus for Reducing Asphaltum to a Liquid or Semi-Liquid for Paving, Roofing, or other Purposes, of which the following is a specification.

In the reduction of asphaltum or bitumen to a liquid for the production of an asphaltic cement for paving, roofing, and other purposes, as heretofore practiced, the asphaltum or bitumen has been first introduced into open kettles or caldrons, and, after having been subjected to a heat sufficient to melt it, the residuum of petroleum, wax-tailings, or other non-volatile solvents or softening material is added. This method, however, is attended with great disadvantages. The asphaltum is liable to burn out or coke at the bottom of the caldron, or to form a core or cake in the center of the caldron, and, as a natural consequence, fumes are emitted, which create a nuisance in the neighborhood of the works. The introduction of the residuum of petroleum into the mass of asphaltum after it has attained a melting heat is attended with great danger, for unless the residuum or wax-tailings is added with great care, small quantities at a time, it is liable to foam over or flash and result in a total destruction of the works, as has been of frequent occurrence.

The object of my invention is to reduce natural crude or refined asphaltum, coal-tar, pitch, or other bituminous substances to a liquid or semi-liquid state in a more perfect, expeditious, economical, and safe manner than has heretofore been done, and at the same time abate or avoid the nuisance arising from the escape of vapors and gases from the asphaltum or bitumen while being reduced, through the agency of heat; and to this end the invention consists, first, of the process or method of introducing the asphaltum or bitumen into the receiver, caldron, retort, or kettle at the same time or after the residuum of petroleum, wax-tailings, or other suitable solvent or softening material has been put in, and then subjecting the mass to the action of heat; and second, in the arrangement and construction of a

receiver or caldron, a furnace, an air heating and forcing device to assist in applying heat to the asphaltum and at the same time act as an agitator to more thoroughly mix the asphaltum with the other ingredients, a safety-valve, vapor-conducting tube, and certain other details of construction hereinafter more fully set forth.

Referring to the drawings, which form a part of this specification, Figure I is a vertical longitudinal section with parts in side elevation. Fig. II is a vertical cross-section on line *x x* of Fig. 1, with the receiver or caldron in elevation. Fig. III is a horizontal section on line *y y* of Fig. 2, with top view of receiver or caldron.

A designates the receiver or caldron, which is preferably made up of plates of wrought-iron securely bolted or riveted together, and mounted or placed over a suitable furnace, *C*. Any desirable number of receivers or caldrons may be grouped together, as the emergency of the case may demand, and so located that branch pipes from the main hot-air pipe (to be hereinafter more fully explained) may be led into them.

A is the man-hole in the top of the receiver or caldron, through which the material to be acted upon is introduced into the caldron, said man-holes being provided with a suitable cover capable of being securely fastened, so as to make an air-tight joint. *e* is a drum located in the top of the receiver, into which the vapors and gas generated by the heated asphaltum or bitumen and residuum of petroleum or wax-tailings pass, and said gases are conducted from thence to the furnace by the pipe *f*, where they are consumed. Lower down on the drum *e* a connection is made for the pipe *g*, which conveys the saturated vapor or gas, in the shape of oil and water, through a condenser, *B*, to the separator *G*, where the water is separated from the oil.

b is a safety-valve which regulates the pressure of air, steam, and gas in the receiver or caldron. *c* is a thermometer by which the heat in the caldron is determined, and *d* is the smoke-stack through which the waste products of combustion pass after having passed through the circuitous flues and over the bar-

riers H, built in between the receiver and outer walls, I, whereby all, or nearly all, the heat is utilized in the heating of the caldron or its contents. E is a furnace for heating air, which is supplied to it by a blower, F, which forces said air through the furnace, and is conducted by the pipe *h* into the receiver or caldron near the bottom thereof, where it is ejected into the asphaltum and assists in heating the same, and also as an agitator to mix the asphaltum and the residuum of petroleum or wax-tailings more intimately together.

The pipe leading from the air-heating furnace to the receiver or caldron should also be provided with a thermometer to indicate the intensity of heat the air possesses which is passing through the same.

The air-conducting pipes may be provided with stop-cocks to regulate the quantity of air admitted or to change the directions of the air-currents, and also to supply a draft to the furnace-fires. Other pipes may lead from the main pipe *h* to other receivers or caldrons.

By shutting off the air, so that it will not pass through the furnace, cold air can be forced into the receiver or caldron to reduce the temperature of the contents should it get too hot, or to cool the receivers after they have been emptied to facilitate the cleaning of the same.

The blower F and pipe *h* can also be utilized to pump the residuum of petroleum or wax-tailings into the receiver from a suitable steam-jacketed tank (not shown) into which the residuum of petroleum or wax-tailings has been previously placed.

For the purpose of better explaining my invention, I have shown the apparatus herein described; but I do not wish to limit myself to the precise construction shown. These devices I have, however, found to work well; but the process by which the asphaltum or bitumen is reduced, by being introduced into the receiver, caldron, retort, still, or kettle simultaneously with or after the residuum of petroleum or wax-tailings or other suitable dissolving material has been put in, may be carried out with other means or agencies effectively.

The effect of introducing the residuum of petroleum, wax-tailings, or other suitable non-volatile softening material into the receiver, caldron, or other melting-vessel prior to or simultaneous with the crude or refined asphaltum or other bituminous material is that it prevents the burning or coking of the asphaltum, is forced into the pores or seams of the asphaltum, and by the intense heat to which it speedily attains the water and moisture are

driven out of the asphaltum in the form of steam, and the asphaltum reduced to a liquid or semi-liquid at a much less degree of heat than has been required heretofore, thus insuring a saving of time and fuel.

The quantity of residuum of petroleum or wax-tailings to be introduced may be varied to suit the kind or quality of cement required—say from one (1) to fifteen (15) per cent.

The cement or liquid having thus been produced by the melting of the asphaltum or bitumen with the residuum of petroleum or wax-tailings is now ready to be drawn off through the pipe or faucet *i* and mixed with the sand, broken stone, or other suitable material to form a mastic, or to be applied or used in any manner desired.

Where several caldrons or receivers are used the work can be conducted in a continuous manner—*i. e.*, while some of the receivers are being charged and fired others are being emptied, &c.—and thus a larger result or a greater amount of work accomplished in a given time than has heretofore been done.

h is a pipe leading from the tail-pipe at the bottom of the condenser to the fume-conducting pipe *f*, whereby any vapors or fumes which might escape are conducted into the pipe *f*, and thence to the furnace, where they are consumed.

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

1. The process of reducing any natural crude asphaltum or refined asphaltum or other hard bitumens to a liquid or semi-liquid state, the same consisting in introducing it into the vessel in which it is melted simultaneous with or after the residuum of petroleum or wax-tailings or other similar suitable softening material has been put in, and then exposing the mass to the action of heat, substantially as set forth.

2. The apparatus herein described, consisting of the closed receiver provided with the fume-conducting pipe; the air-heating furnace with its air-conducting pipe opening into the receiver near the bottom thereof, and the pipe *g*, for conveying the saturated vapors to the condenser, when arranged and constructed substantially in the manner and for the purpose set forth.

DAVIS W. BAILEY.

Witnesses:

FRANCIS D. BAILEY,
WILLIAM F. HOLTON.