(No Model.) 2 Sheets—Sheet 1.

C. H. JOHNSON.

ASPHALT PAVEMENT HEATING APPARATUS.

No. 578,930. Patented Mar. 16, 1897.

Fig. 6.

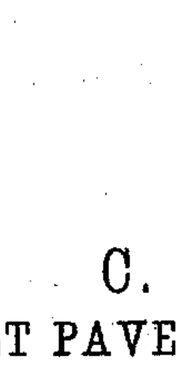
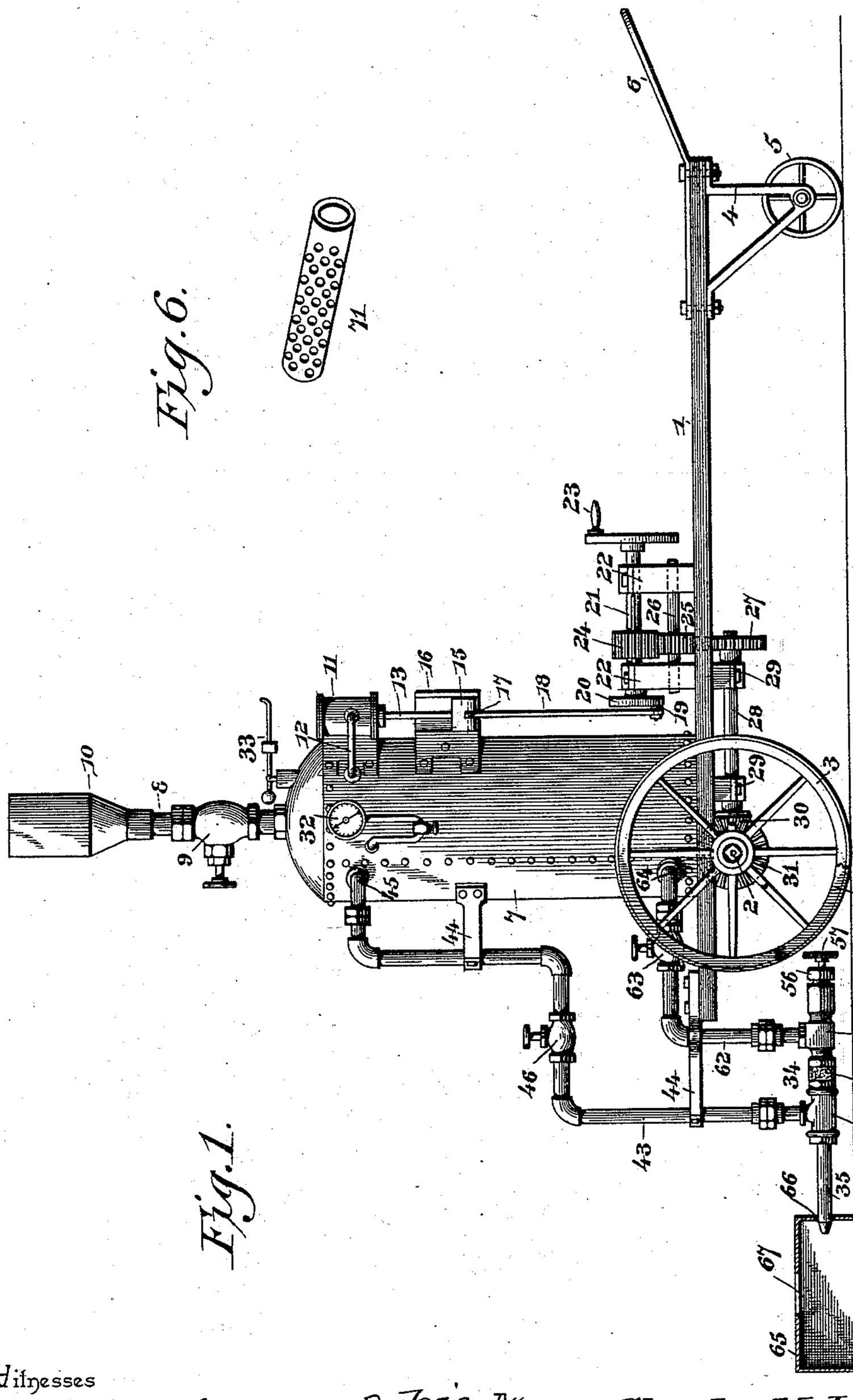


Fig. 1.



Witnesses
Jas. K. McCathran
S. B. Hochamptlet.

Inventor
By his Attorneys, Charles H. Johnson
Chas. Howles.

(No Model.) 2 Sheets—Sheet 2.

C. H. JOHNSON.

ASPHALT PAVEMENT HEATING APPARATUS.

No. 578,930. Patented Mar. 16, 1897.

Fig. 2.

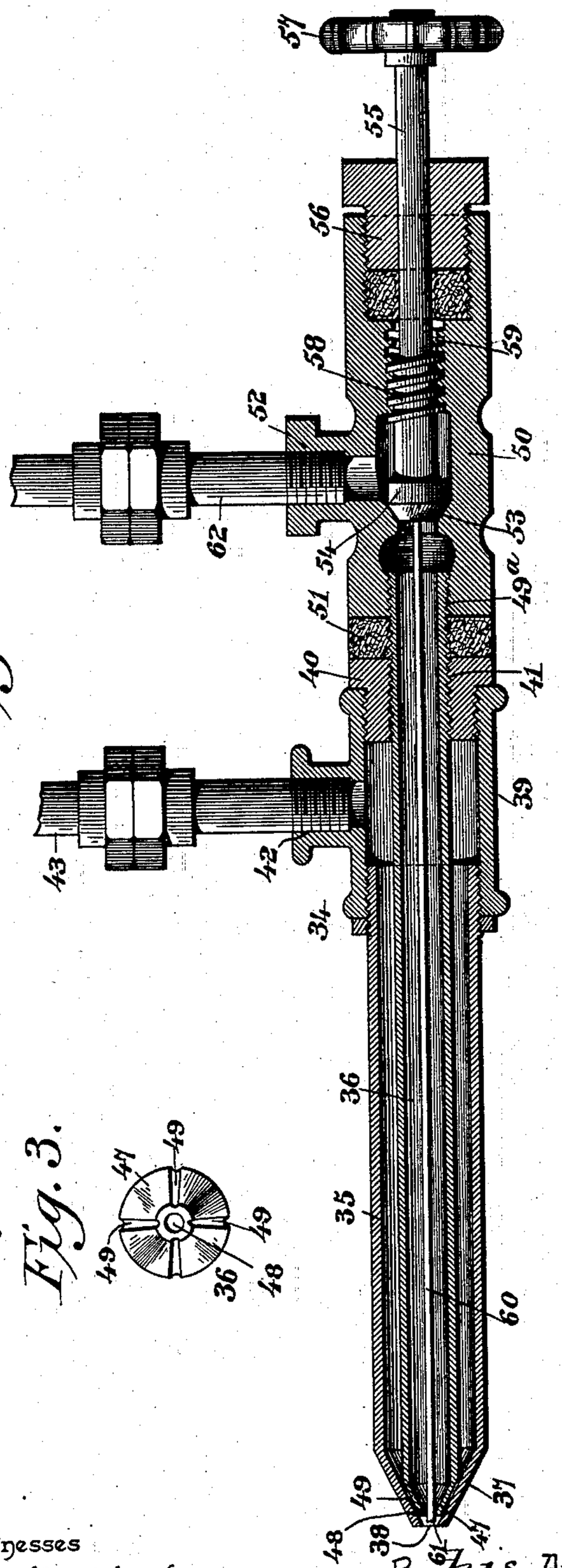


Fig. 3.

Fig. 5.

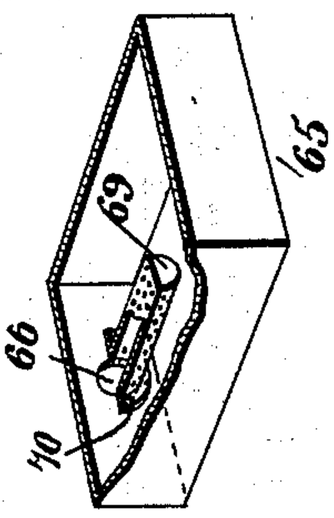
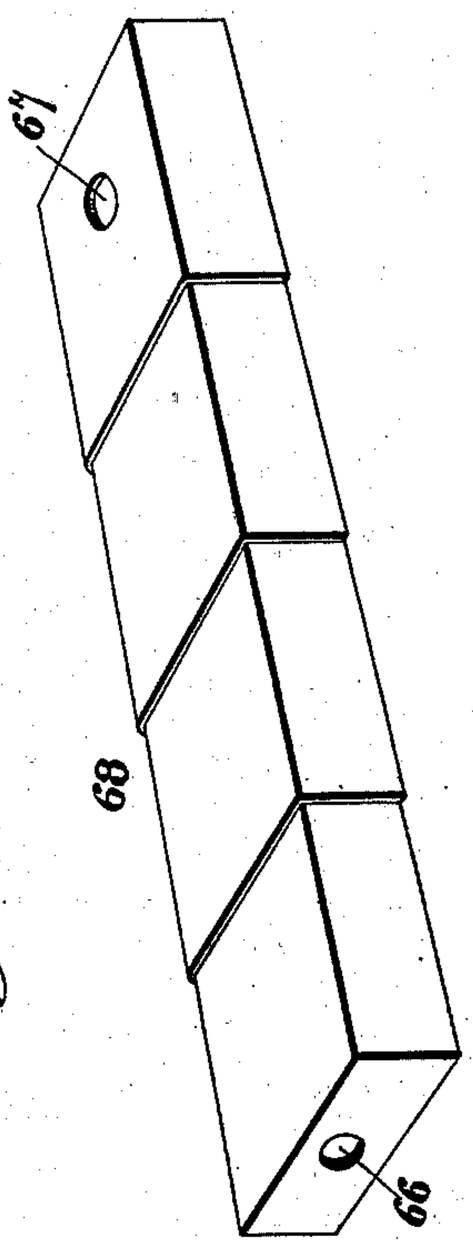


Fig. 4.



Witnesses
Jas. K. McCathran
D. P. Hollaugsotter

Inventor
Charles H. Johnson
By his Attorneys,
Church & Co.

UNITED STATES PATENT OFFICE.

CHARLES H. JOHNSON, OF BUFFALO, NEW YORK.

ASPHALT-PAVEMENT-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 578,930, dated March 16, 1897.

Application filed July 8, 1896. Serial No. 598,433. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. JOHNSON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Asphalt-Pavement-Heating Apparatus, of which the following is a specification.

This invention relates to asphalt-pavement-heating apparatus; and it has for its object to effect certain improvements in apparatus of this character that are designed for repairing and opening asphalt pavements.

To this end the main and primary object of the invention is to provide simple and efficient means for subjecting the asphalt surface to be repaired to an intense heat, so that the same will readily soften and thereby be placed in condition for easy and quick repairing.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a side elevation of an asphalt-heating apparatus constructed in accordance with the present invention. Fig. 2 is an enlarged longitudinal sectional view of the hydrocarbon-burner of the apparatus. Fig. 3 is a detail end view of the inner oil-tube of the burner. Fig. 4 is a perspective view of an adjustable telescopic pavement-hood. Fig. 5 is a detail in perspective, partly in section, of the pavement-hood and a supplemental burner-tube or superheater-tube fitted in place. Fig. 6 is a detail in perspective of another modified form of a supplemental burner or superheating-tube.

Referring to the accompanying drawings, 1 designates a wheeled frame supported near one end on the main driving-axle 2, carrying at its opposite ends the ground-wheels 3, which support the frame 1, for travel over the pavement, and at the same time provide for rotating the axle 2, and at its opposite end the frame 1 has attached to its under side a pendent bearing-bracket 4, in which is journaled a caster-wheel 5, which completes the wheel-support of the frame and assists in readily guiding the same over the pavement. At the end carrying the caster 5 the frame 1 has secured thereto an offstanding handle 6, which is grasped by one or more persons to provide for wheeling the apparatus in a position for use.

Near one end the wheeled frame 1 supports thereon an upright reservoir-tank 7, to the top end of which is fitted a filling-pipe 8, having a cut-off valve 9 and supporting at its upper end a funnel 10, into which the oil is introduced when filling the tank 7. When the tank 7 is being filled with the oil, the valve 9 is opened, so as to allow the oil to readily run from the funnel 10 into the tank, and after the tank has been filled to the desired height the valve 9 is closed, so that the necessary pressure of air and liquid within the tank may be maintained. The character of oil employed in connection with the apparatus is unimportant, but gasolene or crude oil is usually employed, and this oil within the tank is kept under pressure therein by means of the air-pump 11, having a delivery-pipe connection 12 with the upper part of the tank 7, above the level of the oil therein.

The air-pump 11 is preferably fastened at one side of the tank 7, near its upper end, and has its piston-rod 13 connected with a sliding cross-head 15, moving in a cross-head guide 16, attached to one side of the reservoir-tank below the air-pump, which pump may be of any approved construction. The sliding cross-head 15 for the air-pump piston-rod has pivotally connected thereto at 17 the upper end of the pitman 18, the lower end of which pitman is connected to the crank-pin 19 of a crank-disk 20, mounted on one end of an operating-shaft 21, arranged horizontally above the frame 1 and journaled on horizontally-alined bearing-posts 22, supported on the frame. At the end opposite the crank-disk 20 the shaft 21 has connected therewith a crank-handle 23 for turning the said shaft by hand, and between the posts 22 the said shaft 21 has feathered thereon the pinion 24, which normally meshes with an intermediate gear-pinion 25, arranged directly therebelow and carried by a short counter-shaft 26, also journaled in the posts 22. The intermediate gear-pinion 25 meshes with a cog-wheel 27, arranged below the frame 1 and mounted at one end of the drive-shaft 28, supported in bear-

ing-hangers 29, secured to the under side of the frame 1 and carrying at its end opposite the cog-wheel 27 the beveled gear-pinion 30, which meshes with a beveled gear-wheel 31, mounted on the driving-axle 2, thereby completing the gearing connection for operating the air-pump 11 by the forward or backward movement of the wheeled frame.

Whenever the wheeled frame 1 is moved forward or backward the air-pump 11 is operated so as to force air under pressure into the upper part of the tank 7, above the level of the oil therein, and the degree of pressure existing within the tank is indicated by the ordinary pressure-gage 32, connected with the tank near its top end, and at the top of the tank is fitted a safety blow-off valve 33, which automatically relieves the tank 7 from undue pressure when the pressure therein exceeds what is required for actual use, as will be readily understood. When the wheeled frame is at a standstill and the pressure within the reservoir-tank becomes reduced and must be increased to the proper working degree, the necessary increase in pressure is obtained by sliding the feathered pinion 24 on the shaft 21, so as to disengage it from the intermediate gear-pinion 25, and by then turning the crank-handle 23 the pump 11 will be operated, so as to pump an additional quantity of compressed air into the upper part of the reservoir-tank.

In connection with the upright reservoir-tank 7, containing oil and air under pressure, is employed a hydrocarbon-burner 34. The hydrocarbon-burner 34 essentially comprises an outer casing-tube 35 and an inner oil-tube 36, arranged one within the other to provide for conducting oil and air to the point of ignition. The outer casing-tube 35 of the hydrocarbon-burner is provided at one end with a conical or tapered nose 37, having a burner-orifice 38, and at the end opposite the burner-orifice 38 the said casing-tube 35 is fitted in one end of a T-coupling head 39, closed at the end opposite the end in which the tube 35 is fitted by a removable plug 40, having a central threaded opening 41 therein. The coupling-head 39, connected with one end of the casing-tube 35 and supporting such tube in position, has fitted in one side thereof, as at 42, one end of the compressed-air-supply pipe 43, which pipe is supported in suitable bracket-arms 44, extended from the frame 1 and the tank 7, and is connected at its other upper end, as at 45, with the tank 7, so as to communicate with the interior of the tank above the level of the oil therein and provide for conducting compressed air to the burner when in use. The said compressed-air-supply pipe 43 is provided at a suitable point intermediate of its ends with a suitable cut-off valve 46 for controlling the supply of compressed air to the space between the outer casing-tube 35 and the inner oil-tube 36.

The inner oil-tube 36 is of a smaller diameter than the casing-tube 35 and extends longitudinally throughout the entire length of such tube. Said tube 36 is provided at one end with a conical or tapered portion 47, having a discharge-orifice 48 and registering flat against the inner surface of the conical nose 37 of the casing-tube 35. The said conical end portion 47 of the inner oil-tube 36 is provided with an exterior series of longitudinally-disposed air-distributing grooves or channels 49, which serve to distribute the compressed air from the interior of the casing-tube 35 into the burner-orifice 38, at which point the air becomes thoroughly mixed with the oil. The end of the inner oil-tube 36 opposite the conical discharging end thereof is exteriorly threaded, as at 49^a, to engage in and extend through the threaded opening 41 in the closing-plug 40 for the coupling-head 39. The threaded end 49^a of the tube 36 beyond the closing-plug 40 is threaded into one end of a valve-casing 50, horizontally alined with the casing-tube 35, and a suitable thickened packing-washer 51 is interposed between the adjacent ends of the casing 50 and coupling-head 39 for the casing-tube 36.

The valve-casing 50 is provided with a side oil-inlet neck 52 and at one side of said inlet-neck with an interior beveled valve-seat 53, onto which works the valve-disk 54 at the inner end of an adjustable valve-stem 55. The valve-stem 55 is extended through a stuffing-box 56 at one end of the casing 50 and carries upon its outer end a hand-wheel 57 for manipulating the valve 54, and at an intermediate point between its ends the said valve-stem 55 is provided with an exteriorly-threaded portion 58, adjustably engaging the interiorly-threaded portion 59 of the valve-casing 50. The inner end of the valve-stem 55, having the valve-disk 54, has fitted thereto one end of the elongated needle-valve 60, which extends longitudinally through the entire length of the inner oil-tube 36. The outer end of the needle-valve 60 is squared or flattened, as at 61, and registers inside of the discharge-orifice 48, so as to close and open said orifice and at the same time provide for forcing out any obstructions that might stop or clog up the passage for the oil out of the inner tube.

The side oil-inlet neck 52 of the valve-casing 50 has fitted therein one end of the oil-supply pipe 62, having a suitable cut-off valve 63 and connected at its other end, as at 64, with the reservoir-tank 7, near the bottom thereof, so as to conduct a supply of oil under pressure into the valve-casing 50 and the inner oil-tube 36, as will be readily understood.

The hydrocarbon-burner 34 is adapted to be used in connection with a pavement-hood 65, which is essentially and preferably a rectangular box open at the bottom and designed to be placed directly over that portion of the asphalt pavement which is to be opened. The open-bottom pavement-hood 65 is provided in one side with a burner-orifice 66,

adapted to receive therein the nose of the hydrocarbon-burner 34, and in the top the hood 65 is provided with an opening 67, through which the mixture of oil and air introduced into the hood may be readily ignited. The pavement-hood may of course be of any desired shape or size, according to the character of the surface to be repaired, and, as illustrated in Fig. 4 of the drawings, the hood may be made adjustable by being constructed of a series of telescoping box-sections 68, slidably registering with each other to allow the hood to be adjusted to the desired compass according to the size of the spot in the pavement over which the same is placed, and, furthermore, by making the hood telescopically adjustable a long narrow cut may be made in the pavement at one operation for the purpose of cutting out for gas-pipes and similar work, as will be readily understood by those skilled in the art.

Ordinarily the pavement-hood 65 is of the simple form described; but, if desired, a supplemental burner-tube 69 may be employed in connection with the hood, as illustrated in Fig. 5 of the drawings. The supplemental burner-tube 69 is illustrated as being of a semicylindrical form and flanged at one end, as at 70, to the inner side of the hood in alinement with the orifice 66, so as to receive the mixture of oil and air from the hydrocarbon-burner 34 as it is jetted therefrom through the opening 66. The semicylindrical supplemental tube 69 acts in the capacity of a superheater to intensify the heat within the hood and thereby insure a rapid softening of that portion of the asphalt pavement covered by the hood. Another form of superheating-tube is illustrated in Fig. 6 of the drawings and designated by the numeral 71, said tube 71 simply being a short cylindrical perforate tube suitably secured at one end to the inner side of the hood in alinement with the orifice 66 and operates, in connection with the burner 34, in substantially the same manner as the semicylindrical tube 69.

In the operation of the apparatus the pavement-hood is placed on the pavement over the place to be repaired or opened, and then the wheeled frame is moved to a point so as to carry the nose of the burner into the orifice 66 of the hood. The valves 46 and 54 are then opened and a match or its equivalent thrown into the hood through the top opening 67, so as to ignite the combustible mixture. The heat within the hood becomes very intense within a short time, so that the pavement is very rapidly softened, and when an adjustable pavement-hood is not used the heated spot may be made longer by simply moving the apparatus and the hood forward to the proper place and then proceeding as before, the heated or softened portion of the asphalt being shoveled out while the new spot is being heated, thereby providing for a quick repairing or opening of the pavement.

By reason of the air-pressure within the reservoir-tank and the manner of conducting the air and oil to the burner it will be observed that the air and oil are taken from the tank at the same pressure, and the air, which is forced through the grooves or channels 49, is caused to be perfectly mixed with the oil, so as to insure a perfect combustion at the point of burning, and, in connection with the needle-valve for the oil-tube, it will be observed that the valve 54 opens a trifle in advance of the complete withdrawal of the needle-valve from the orifice 48, thereby allowing the oil to pass out of the oil-tube in sufficient quantities to make a proper heat, and by manipulating the proper valves the quantity of oil and air may be readily controlled as required.

Changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In an asphalt-heating apparatus, a wheeled frame having a main driving-axle, a reservoir-tank supported on the frame and adapted to hold oil and air under pressure, a hydrocarbon-burner having suitable pipe connections with the tank, an air-pump supported by the tank and having a delivery-pipe connection therewith, a suitably-supported operating-shaft having a pitman connection with the air-pump, gearing connections between said operating-shaft and the driving-axle, means for throwing said shaft out of gear with the driving-axle, and means manually to operate the said operating-shaft, substantially as set forth.

2. In an asphalt-heating apparatus, the combination of a reservoir-tank adapted to hold oil and air under the same pressure, a hydrocarbon-burner having separate oil and compressed-air supply pipe connections with the tank, and means for automatically charging the tank with compressed air by the forward or backward movement of the apparatus, substantially as set forth.

3. In an asphalt-heating apparatus, a wheeled frame having a main driving-axle, a reservoir-tank supported on the frame and adapted to hold air and oil under the same pressure, a hydrocarbon-burner having separate oil and compressed-air supply pipe connections with the tank, an air-pump supported at one side of the tank and having a delivery-pipe connection with the upper part thereof, a fixedly-positioned gear-pinion supported on the frame and having suitable driving connections with said driving-axle, an operating-shaft supported on the frame and carrying at one end a crank-disk having a pitman connection with the air-pump, and at its opposite end a crank-handle, and an adjustable pinion feathered for a sliding movement on said operating-shaft and adapted to mesh

with said fixedly-positioned gear-pinion, substantially as set forth.

4. In an asphalt-heating apparatus, the combination with a hydrocarbon-burner, of an open-bottom pavement-hood comprising a series of telescoping box-sections and provided in one side with an orifice for the reception of the nose of the burner, the telescoping sections permitting of an adjustment of the box to cover different areas of pavement, substantially as set forth.

5. A hydrocarbon-burner comprising an outer casing-tube having a coupling-head at one end and a conical nose with discharge-orifice at the other end, a plug in one end of the coupling-head, an inner oil-tube arranged longitudinally within the casing-tube and provided at one end with a conical nose registering flat against the inner surface of the nose of the outer tube and provided in said nose with a series of exterior longitudinally-disposed air-distributing grooves or channels serving to discharge air into the discharge-orifice of the outer tube, said oil-tube being extended at one end through the plug at one end of the coupling-head, a valve-casing fitted on the projecting end of the oil-tube and having an interior valve-seat and an oil-supply-pipe connection, an air-supply-pipe connection with the outer casing-tube, and an adjustable valve-stem mounted in the valve-casing and carrying at its inner end a valve-disk and a needle-valve, said needle-valve extending longitudinally through the oil-tube and provided with a flat outer end working in the discharge-orifice of the inner oil-tube, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHAS. H. JOHNSON.

Witnesses:
JOHN H. SIGGERS,
THEODORE DALTON.