(No Model.) 2 Sheets—Sheet 1.

C. G. MOORE.

OIL BURNER.

No. 528,336. Patented Oct. 30, 1894.

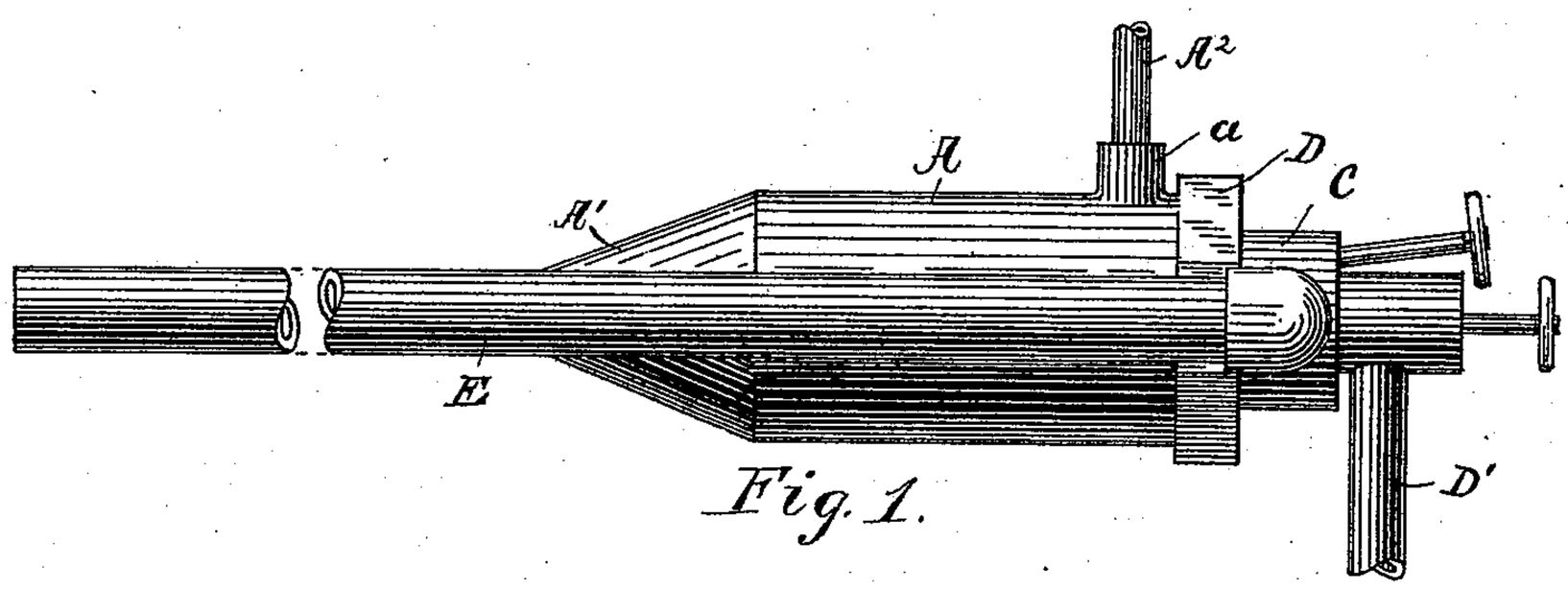

Fig. 1.

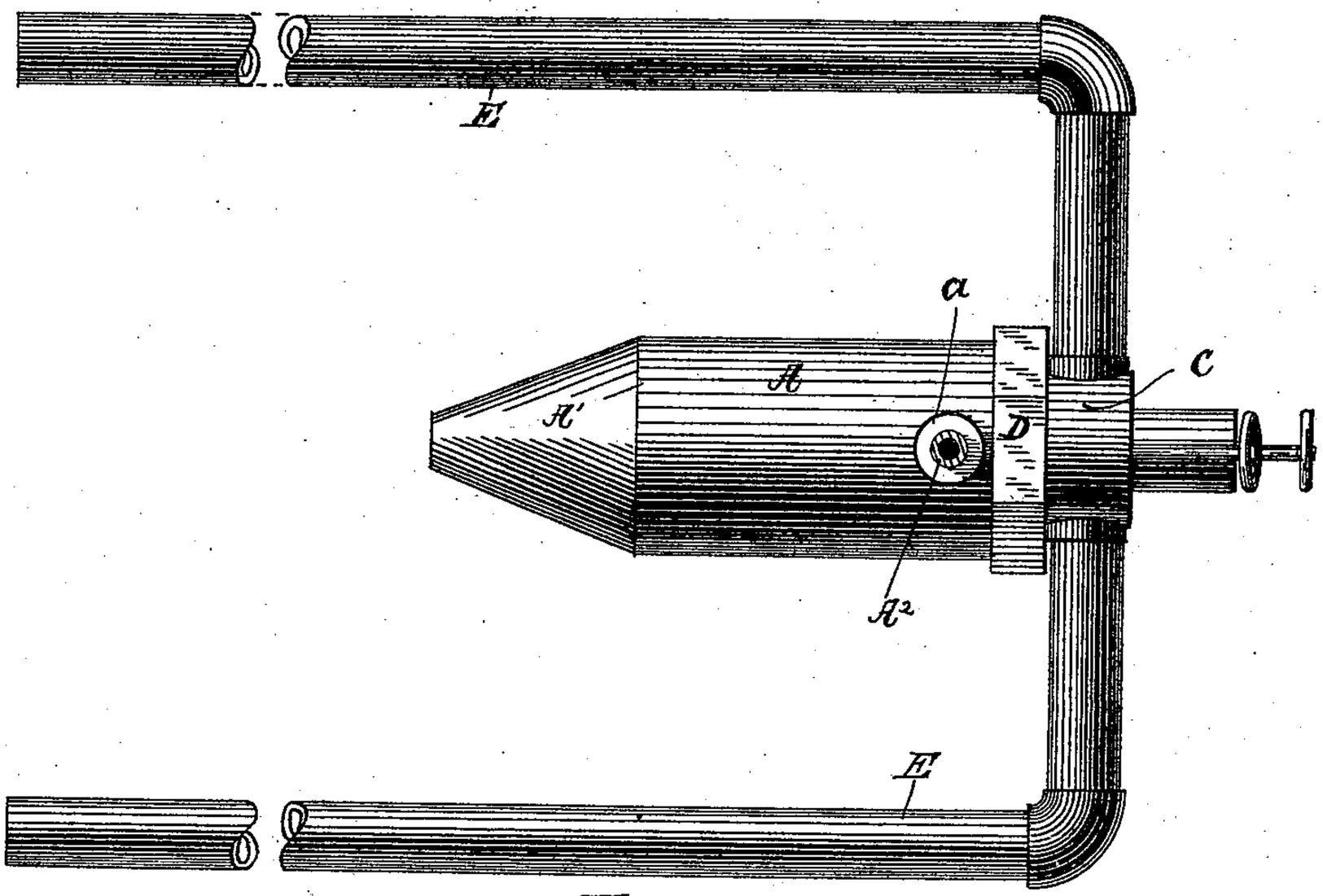

Fig. 2.

Witnesses:
T. F. Meany
Hill & Hafer.

Inventor,
Chauncey G. Moore,
By Joseph A. Minturn,
His Attorney.

(No Model.) 2 Sheets—Sheet 2.

C. G. MOORE.

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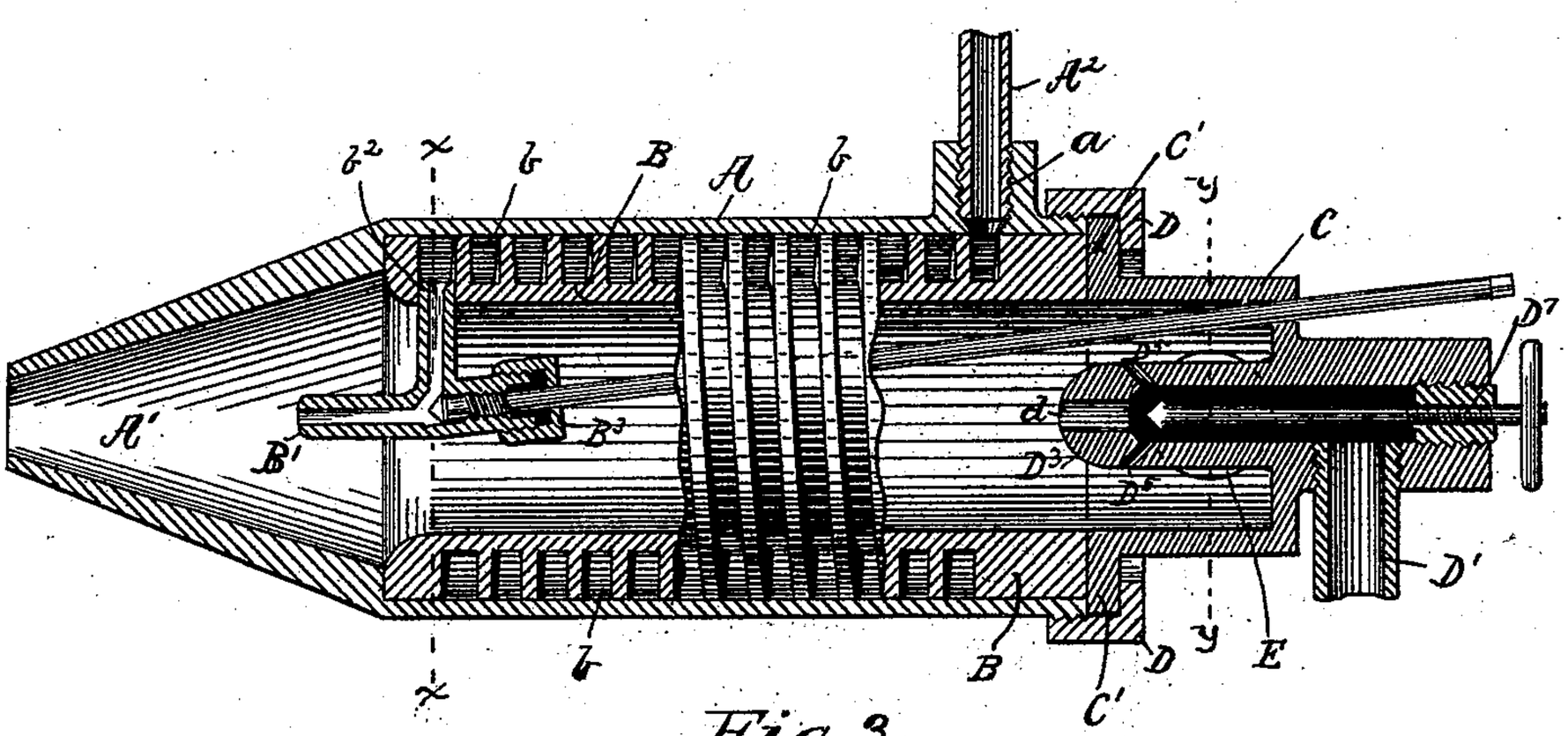

Fig. 3.

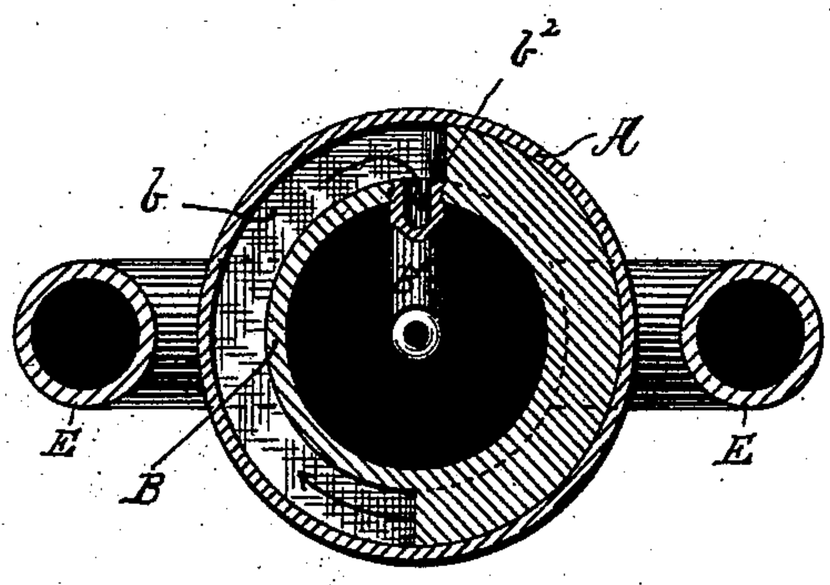

Fig. 4.

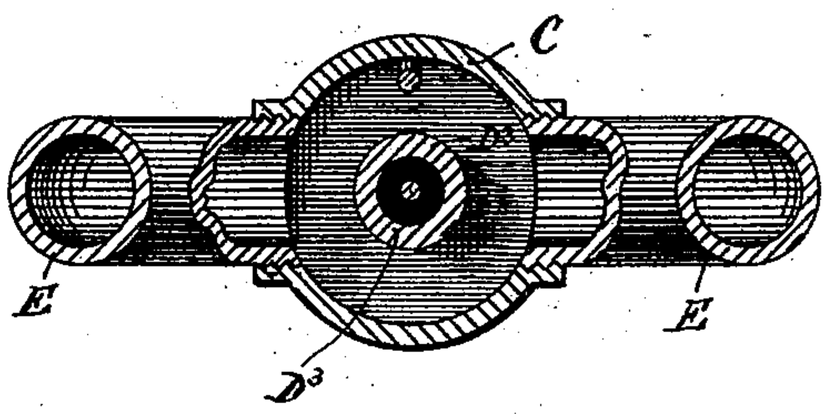

Fig. 5.

Witnesses:

T. F. Meany

Hill & Baker

Inventor,

Chauncey G. Moore,

By Joseph A. Minturn

His Attorney.

UNITED STATES PATENT OFFICE.

CHAUNCEY G. MOORE, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO THOMAS F. SCULLIN, OF SAME PLACE.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 528,336, dated October 30, 1894.

Application filed January 10, 1894. Serial No. 496,393. (No model.)

To all whom it may concern:

Be it known that I, CHAUNCEY G. MOORE, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Oil-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in means for utilizing crude oil for fuel and has special reference to improvements in burners to be used in heating steam boilers and the like, in which a high temperature and a uniform and continuous heat are required.

The accompanying drawings illustrate my invention.

Figure 1 is a view in side elevation of my complete burner detached from the furnace in which it will be used. Fig. 2 is a plan view of same also detached from the furnace. Fig. 3 is a view in longitudinal vertical section showing the inside construction of the burner. A portion of the near side of the inner spirally grooved cylinder is left without being sectioned in order to show the construction of the grooves. Fig. 4 is a transverse section of the burner through the line *x x*, of Fig. 3, and Fig. 5 is a transverse section of the burner through the line *y y*, of Fig. 3.

Similar letters refer to like parts throughout the several views of the drawings.

A is the outside cylindrical tube of the burner. One end is provided with outside threads by means of which an additional section of the burner is attached in the manner hereinafter to be described. The opposite end of the cylinder A terminates in a tapering construction A′ having a central opening and forming a nozzle through which the combustible material will be discharged into the furnace.

a is an inlet or opening located near the threaded end of the cylinder A and is connected by means of the pipe A^2, with an oil tank or reservoir located at a suitable distance away from the furnace to be safe from danger of explosion from the fire, and suitably elevated to give the necessary "head" or pressure required to force the oil through the burner in the manner as will be fully explained.

B is a second tubular cylinder having an outside diameter equal to the diameter of the bore of the tubular cylinder A and is adapted to be inserted within said tube A as is shown in Figs. 3 and 4.

The walls of the inside tubular cylinder B are sufficiently thick to allow the continuous spiral groove or thread, *b*, to be either cut or cast on the outside of the tube. This spiral groove will commence immediately under the opening, *a*, in the tube A and will have outside communication through said opening. The groove will terminate near the opposite end of the tube B, in an opening b^2 which communicates with the inside of the tube B.

B′ is a nozzle bent at right angles and having one end inserted in the opening *b* and so proportioned and placed that the other end and the passage leading up to it will be approximately aligned with the axis of the tube B, the outlets to both nozzles, A′ and B′, being in the same direction. The construction as above described, provides a conduit for the oil, which, as previously related, will be supplied from a reservoir through the pipe A^2 and through the opening, *a*, into the spiral groove *b*, and discharged into the burner through the nozzle B′. In order to regulate the discharge a valve B^3 having a threaded stem working through a threaded opening will be provided, and the stem continued to the outside of the valve within easy access to the fireman.

The end of the tube A opposite the nozzle is closed by means of the cap or end piece C. This end piece is cupped out on one side so as to form a continuation of the bore of the tube B and is placed with the cupped side in. It is also provided with a flanged rim C′ which fits up against the ends of both of the tubes A and B and is held in place by means of the coupling D which fits over the end piece C and screws onto the threaded end of the tube A as is clearly shown in Fig. 3.

D^3 is a nozzle projected into the burner from the bottom of the cupped side of the end piece C. The opening through the nozzle communicates with the steam supply pipe D′ and terminates in the central opening *d* aligned with the longitudinal axis of the tube B. The supply pipe D′ communicates with the steam boiler and supplies the live steam to the burner.

D⁵ are diagonal openings (preferably four) entering the nozzle at an acute angle to the longitudinal axis of the burner, and are for the purpose of discharging the steam more directly against the walls of the tube B in order to heat them and to raise the oil in the grooves to the highest possible degree of temperature, and the object in providing the spiral grooves and of running the oil through the groove is to give the oil the maximum exposure and render it as nearly volatile by the action of the heated steam, as possible before the oil is discharged. The egress of the steam through the nozzle D³ will be controlled by means of the valve D⁷. A screw-threaded valve stem enables the valve to be operated from the outside.

On each side of the end piece C and communicating with its interior, are the air supply pipes E. It has been found by practice that better results are obtained by taking the heated air direct from the combustion chamber of the furnace and for that reason the pipes E, after leaving the walls of the end C are bent and projected forward into the combustion chamber and are continued a sufficient distance to prevent the flame in the furnace from passing back through the tubes into the burner.

By my construction as above described, the hot air and the steam are united and the oil introduced at such a high temperature that it immediately volatilizes and combining with the steam and air is thoroughly mixed and the mixture discharged from the nozzle A′ in the form of a very inflammable gas which yields an extremely hot flame when ignited. No residue is left in the burner nor is deposited on the grate bars of the furnace as is the case with oil burners heretofore.

I have here shown the grooves for the passage of the oil as running spirally around the walls of the tube B, but I do not wish to limit the construction to spiral grooves. It is evident the grooves might run in a coil longitudinally between the tubes A and B, or the grooves might be merged into one or more chambers or a jacket that would subject the oil to the action of the heat.

Special attention is called to the construction and the location of the oil nozzle B′ by which the oil instead of being delivered into the burner near the steam inlet, as is usually done, is delivered near the discharge end of the burner and by the downwardly depending construction of the nozzle with its enlargement forming the valve seat, that portion of the outflowing current of air and steam coming against the obstruction formed by the nozzle is turned aside and a trough is thus formed in the current into which the oil from the end of the nozzle is deposited and is forced out with the air and steam. The current reuniting immediately after it leaves the nozzle completely surrounds the oil rendering its escape impossible and by subjecting it to a heat from all sides, thereby more readily volatilizing the oil and causing it to mix with more thoroughness with the steam and air. Where the the oil is admitted near the place where the steam comes into the burner and is allowed to drop down upon the current of steam from some point above, as is usually done, the swiftly moving current of steam simply throws the oil aside by its own impetus and the oil falls to the bottom of the burner. The volume of steam being smaller at the point of entry there is more room in consequence for the oil to fall aside than if introduced near the outlet where the current has had opportunity to expand.

I claim—

1. In a hydro-carbon burner, the combination of a central chamber for the passage of steam and air, steam and air inlets at one end of said chamber, a common outlet therefor at the other end, an annular oil chamber surrounding the central chamber, an oil inlet into said annular chamber communicating with the oil supply, and an oil outlet discharging into said central chamber, said outlet being directed downwardly from the annular chamber to about the axial line of said chamber, and thence along said axial line, substantially as described.

2. In a hydro-carbon burner, the combination of an inner casing, an end cap inclosing the rear end thereof and containing steam and air openings discharging into said casing, an outer casing surrounding the inner casing and forming therewith an oil chamber, an oil inlet pipe near the rear end of said chamber, a spiral rib extending radially from one casing to the other, and longitudinally the length of the oil chamber, the distance between two consecutive threads of said rib being approximately equal to the diameter of the oil inlet, whereby a spiral oil passage of said diameter is formed around the air and steam chamber, and an oil outlet at the front end of said passage discharging into the steam and air current, substantially as described.

3. In a hydro-carbon burner, the combination of a steam and air draft chamber, an oil chamber surrounding the draft chamber, an oil outlet at its front end discharging into the steam and air current, and an end cap or cover at the rear end of the draft chamber, carrying an air inlet pipe, and a steam nozzle, the latter directed into said draft chamber and comprising a main steam vent directed along the draft chamber and divergent steam vents directed toward the walls of the draft chamber to heat the same, and thereby heat the oil in its passage through said oil chamber, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHAUNCEY G. MOORE.

Witnesses:

JOSEPH A. MINTURN,

WM. HAFER.