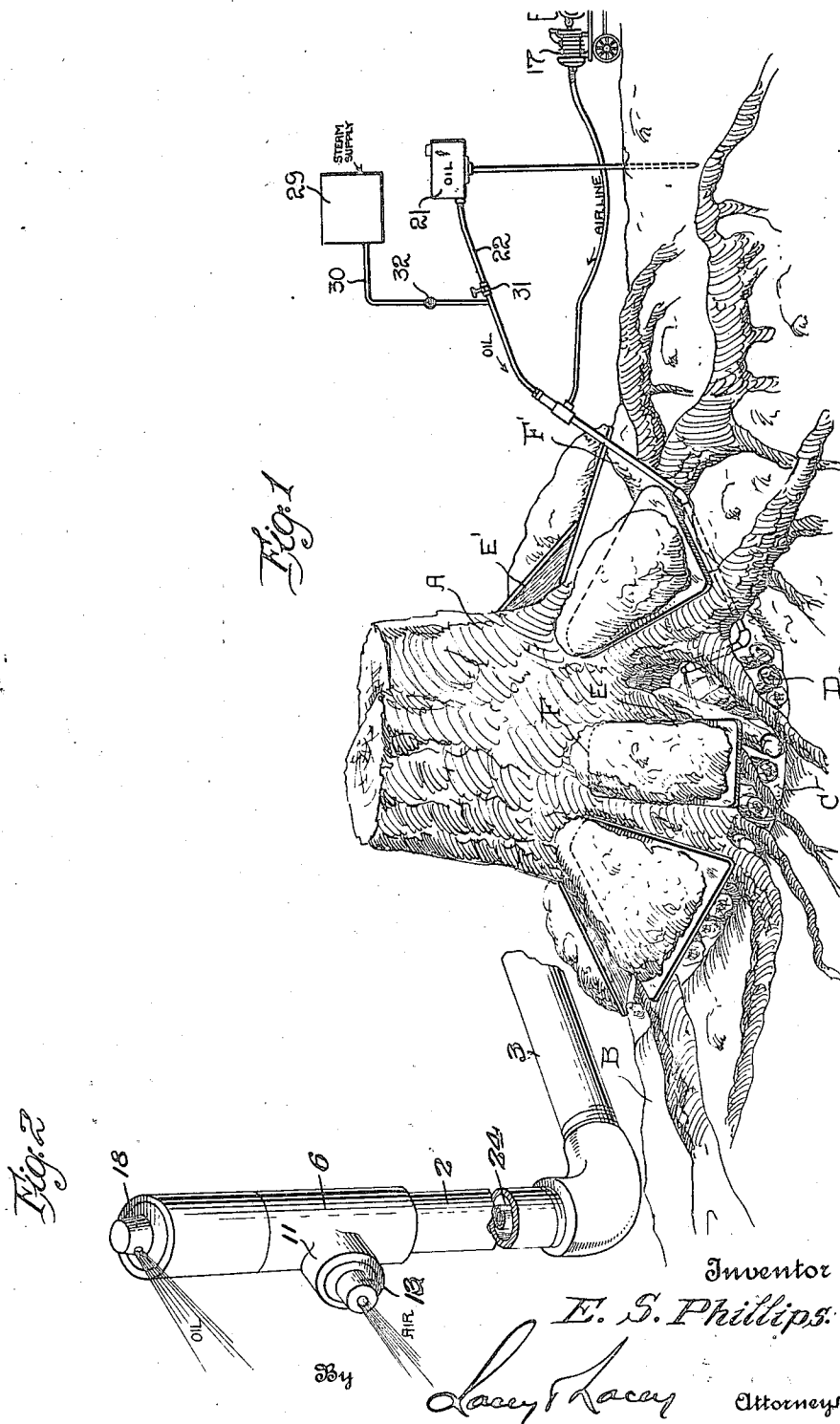


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E. S. PHILLIPS.
METHOD OF DESTROYING STUMPS.
APPLICATION FILED NOV. 21, 1918.

Patented Nov. 21, 1922.
2 SHEETS—SHEET 1.

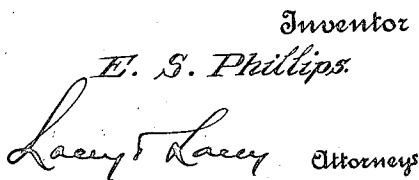


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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

EDWARD S. PHILLIPS, OF SEATTLE, WASHINGTON.

METHOD OF DESTROYING STUMPS.

Application filed November 21, 1918. Serial No. 262,566.

To all whom it may concern:

Be it known that I, EDWARD S. PHILLIPS, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Methods of Destroying Stumps, of which the following is a specification.

This invention relates to a novel method of destroying stumps by fire.

In the development of my method I have in view the principle that heat must be applied for a considerable length of time, as compared with the length of time consumed in the carrying out of other methods, so that the destruction of the stump and its roots will be relatively slow but complete. While I will hereinafter refer to "destruction" of stumps by my method, I contemplate primarily the burning of the stump so as to provide for its complete loosening and separation from the soil and the destruction of substantially all of the roots, at the same time not necessarily destroying the body of the stump so that should it prove profitable to do so, the unburned stump may be saved for future treatment for the purpose of extracting the various chemical products which may be obtained from wood by the well-known processes of destructive distillation. In fact the primary object of importance is the burning out of the roots of the stump so that these roots will not be encountered when the land is tilled, and it is with this object that my invention is chiefly concerned, the destruction of the body of the stump or its salvage for future treatment for the removal of its volatile constituents being a matter of secondary consideration. In consideration of the foregoing the present invention contemplates a method which may be carried out at little expense for labor or fuel and which, while contemplating the relatively slow destruction of the stump, may be employed in acting simultaneously upon any desired number of stumps.

In the accompanying drawings:

Figure 1 is a view partly in perspective and partly in section illustrating in a general manner the method of the invention;

Fig. 2 is a perspective view of the burner nozzle of the apparatus;

Fig. 3 is a vertical sectional view through the burner nozzle.

Fig. 4 is a side elevation of the burner.

The burner of the apparatus is indicated in general by the reference numeral 1 and includes a nozzle section 2, a section 3 which leads substantially at right angles from the intake end of the nozzle section, and a section 4 which leads at a more or less obtuse angle from the section 3. The nozzle section 2 comprises an outer tube 5 to the discharge end of which is fitted the lower end of a nozzle 6 comprising a cylindrical body 8 interiorly threaded between its ends as at 9 and at its upper end as at 10 and provided with a lateral branch 11. A tip 13 is threaded into the branch 11 and has an axial passage 14 of relatively small diameter through which air is discharged, the air being supplied through the said pipe 5. In order that air may be supplied under pressure, a T-coupling 15 has one branch fitted to the outer end of the outer tube of the section 4, as clearly shown in Fig. 4 of the drawings, and fitted into another branch of this coupling is a supply pipe 16 which leads from any suitable air compressor illustrated diagrammatically in Fig. 1 and indicated by the numeral 17.

Fuel is discharged from the nozzle 6 through a tip 18 fitted into the upper end of the body 8 of the nozzle, this tip having a discharge orifice 19 provided with a lateral branch 20 presented in the same direction as the discharge end of the tip 13. Liquid fuel is conveyed by gravity from a supply tank 21 through a pipe 22 which pipe is fitted through the coupling 15 and extends within the outer pipes of the sections 3 and 4 of the burner. Within the outer pipe of the section 3 of the burner and substantially at the juncture of this section with the section 2, the pipe 22 opens into the lower end 23 of a tube 24 which extends axially within the section 2 of the burner and is fitted into a bushing 25 which in turn is arranged within the nozzle 6 above the jet 13. This bushing 25 closes the branch 8 except to the fuel or steam vapor discharged from the upper end of the tube 24, and thus air fed under pressure to the air conducting pipes for discharge through the jet 13 cannot commingle with the burner with the fuel or steam vapor supplied through the pipe 22. A heat conducting member is provided and comprises a rod 26 provided at suitable points in its length with radially projecting spacing studs or protuberances 27. By reason of

the provision of these studs, the surface of the rod 26 is spaced from the wall of the tube so that passage of vaporized fuel upwardly through the tube and into the space 5 between the jet 18 and bushing 25 is not in any way interfered with. At this point it will be understood that when the burner is in operation it will become more or less highly heated at least throughout its nozzle 10 section 2 and the heat will be conducted to the rod 26 which will thus become heated at its lower end to a temperature sufficiently high to immediately volatilize the liquid fuel fed through the lower end of the tube 15 24 to the pipe 22.

In order to provide against the rapid feed of oil from the tank 21 through any suction created in the pipe 22 or tube 24, it is preferable that the pipe at any suitable point, 20 as for example adjacent the tank 21, be provided in its upper side with one or more small openings 28 to admit air.

In Fig. 1 of the drawings there is diagrammatically illustrated a source of steam 25 supply indicated by the numeral 29, and a pipe 30 leads from this supply to the pipe 22 and communicates therewith, a valve 31 being preferably provided in the pipe 22 between the tank 21 and the point of juncture 30 of the pipe 30 with the said pipe 22, and a valve 32 being also preferably provided in the length of the pipe 30.

For convenience in describing the method 35 involving the present invention, the stump to be destroyed is indicated in Fig. 1 of the drawings by the reference letter A and the soil into which the roots of the stump extend, by the reference letter B, the reference letter C indicating a pit which will be presently referred to, the letter D indicating 40 combustible material, the letters E and E' indicating certain plates which are employed about the stump, letter F loose soil to be placed upon the plates E and E' and the letter F' other loose soil to be placed 45 about a portion of the burner. Carrying out the method the pit C is first formed by blasting out the soil from beneath the body of the trunk and around the roots of the 50 trunk where they join the trunk. Ordinarily this pit will be of about the depth and extent illustrated in Fig. 1 of the drawings but, it may be shallower or deeper or of greater or less breadth depending upon varying conditions which will 55 be encountered. In producing this pit enough soil is removed from beneath the trunk to permit of the placing of one or any suitable number of charges of a slow explosive such for example as, twenty-per cent 60 dynamite, these charges being placed at a depth of two or three feet and after placing being exploded so as to blow out the soil for the purpose stated. This explosive 65 charge employed in the manner stated serves

not only to produce the pit required for the carrying out of the other steps of the method, but, also it serves to some extent to break up the roots and especially to loosen the roots 70 in the soil. Any loose soil left in the pit after the explosion of the charge may be removed in any convenient manner and when the pit has been sufficiently cleared, the combustible material D which may consist of brush, branches of trees, pieces of decayed 75 log, bark, pine cones, etc., is deposited within the pit in suitable quantity after which a number of the plates E are brought into use and employed as will now be explained. These plates E may be of sheet asbestos, of 80 sheet metal, or of any other suitable heat resisting material, and may be of various sizes and shapes, selected ones of the plates of suitable sizes and shapes being disposed upon the upper sides of the roots of the 85 stump in a manner to span adjacent roots as shown in Fig. 1, and to extend to or substantially to the edge of the pit. After these plates have been suitably arranged the loose soil F is disposed upon the plates so as to 90 hold them in position and also to retard or prevent too great radiation of heat from the plates which would only result in waste of heat. The arrangement of the plates may 95 differ under different conditions but ordinarily it will be found advisable to so arrange the plates as to span all adjacent roots with the exception of one or two at one or both sides of the point at which the burner 100 of the apparatus is to be located. The object in view in making use of the plates E is to form in effect a roof for the pit so that the walls of the pit, the said plates, and the under side of the trunk and its roots will in effect form a fire box in which combustion 105 may be effected with the loss of as little radiated heat as possible. The burner is next placed in about the position shown in Fig. 1, preferably by first preparing a suitable channel or valley into which the sections 3 and 4 110 are laid in the manner shown in Fig. 1 with the burner section 2 extending in a general upward direction and located wholly within the pit and beneath the stump. The loose soil F' is then deposited about the sections 3 115 and 4 of the burner which extend below the ground level so that these sections will be in a sense protected from the intense heat which is to be generated within the improvised fire box. The object in view in leaving 120 one or more spaces unspanned by the plates E at one or both sides of the point of location of the burner is, of course, to provide for draft. If desired the plates E' may be brought into use and placed in position overlapping the inner ends of the plates E to 125 prevent the loose soil F sitting down between the said plates E and the stump and its roots. The soil F may be the soil removed in forming the pit C or it may be 130

sand, clay, or soil of any other nature; also it may be sod. While Fig. 1 of the drawings illustrates but a single burner, two or more of the burners might be placed in position, the burner, where a single one is employed, being placed upon the windward side of the stump. Where more than one burner is employed, the burners may be arranged as dictated by conditions and, of course, they may be operated simultaneously or separately at desired intervals.

The burner having been placed and the other preparations having been made as above pointed out, the valve 31 is opened, thus permitting the feed of liquid fuel to the burner and when the fuel appears at the orifice 20, the combustible material D is lighted and the air compressor 17 is set in operation, thus supplying air to the burning fuel within the pit. At this time the roots and the portion of the body of the stump exposed to the flames will begin to exude sap and other volatile combustible substances contained therein, thus forming an auxiliary supply of fuel. After about twelve hours time an examination should disclose the presence of considerable quantity of coals and there should be practically incandescence in at least several places. When these conditions are noted an additional quantity of the material D either dry or water-soaked may be added in small portions, care being taken not to supply too great a quantity at any one time. When the generation of heat is general, the supply of liquid fuel from the tank 21 may be cut off and the valve 30 opened to admit steam to the burner nozzle where it will be discharged through the jet 18. As before stated, a condition of incandescence has been reached at this stage of the operation, and the admitted steam, in the presence of the carbon and under the high temperature, will result in the production, as in the manufacture of water-gas, of carbon-monoxide and hydrogen which mixture of gases then serves as the chief source of fuel supply in the continued carrying out of the burning. Of course, the air is not supplied continuously through the burner nozzle but it is employed chiefly as a means for "boosting" the combustion when it does not appear to the operator that this is proceeding as satisfactorily as desired. After the operation has continued for several days, some portions of the roots will be seen to have been completely burnt out and the sides of the pit may partly or wholly cave in.

From the foregoing description of the method involving the invention, it will be understood that due to the intense heat generated within the pit and beneath the stump and further due to the relatively long continued generation of this heat, the roots of the stump will be practically thoroughly dried out substantially if not completely to their extremities and will eventually be destroyed by the flames which will then more readily reach them as they have been loosened through the explosion of the charge in forming the pit. By reason of this fact, there will be practically no roots left in the ground to offer obstructions to tillage and yet it is not necessary that the entire stump be actually destroyed by burning.

Having thus described the invention, what is claimed as new is:

1. The method of destroying stumps which consists in exploding a charge beneath the stump to provide for the formation of a pit beneath the stump and to loosen the roots of the stump, roofing the pit, maintaining a fire within the pit to produce a mass of incandescent fuel, and discharging a jet of steam against said mass.
2. The method of destroying stumps which consists in forming a pit beneath the stump, building a fire within the pit, and, when the fuel and surrounding material has reached a state of incandescence, introducing steam into the pit against the incandescent mass of fuel.

In testimony whereof I affix my signature.

EDWARD S. PHILLIPS. [L. S.]