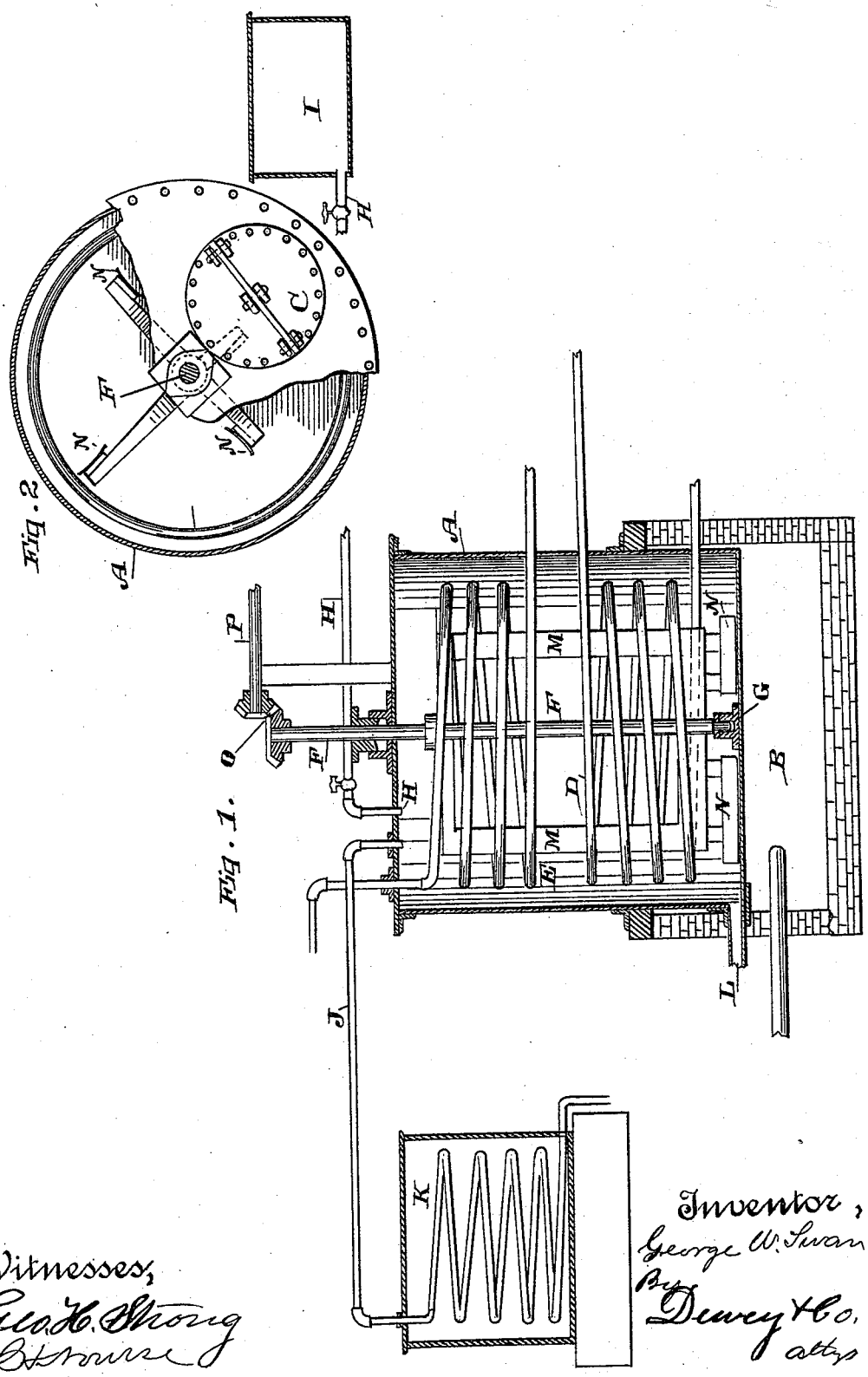
(No Model.)

# G. W. SWAN.

## MIXING APPARATUS.

No. 421,883. Patented Feb. 18, 1890.

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# UNITED STATES PATENT OFFICE.

GEORGE W. SWAN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-FOURTH TO WARREN B. EWER, OF SAME PLACE.

## MIXING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 421,883, dated February 18, 1890.

Application filed April 10, 1889. Serial No. 306,726. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. SWAN, of the city and county of San Francisco, State of California, have invented an Improvement in Mixing Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus for mixing substances having a wide range of volatility. It consists in a combination of mechanism which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section taken through the apparatus. Fig. 2 is a plan or top view.

This apparatus is especially intended to mix the materials which are employed to form a paint or covering compound, which consists of a mixture of benzine with a paraffine or with the residue which is left after the distillation of the lighter hydrocarbons from crude petroleum. It is necessary in mixing these ingredients to mix at a temperature which is sufficient to melt the paraffine or residue, and it will be manifest that under ordinary conditions it will be impossible to mix the volatile benzine with the heavy and highly-heated solid material, because the benzine will be evaporated and driven off before it is possible to make the mixture.

My invention is designed to overcome this difficulty by providing a closed tank or chamber with means for melting the solid material and maintaining it in a melted condition, means for introducing the benzine and incorporating it with this material, a means for conveying away and condensing that portion of the benzine which is volatilized during the process, and also a means for cooling the upper portion of the chamber to prevent a too rapid volatilization of the benzine after the mixing is completed.

A is the exterior tank or vessel, which is preferably made of boiler-iron, and is supported upon a foundation of brick-work or in any other suitable manner, so as to provide a furnace or heating-chamber beneath it, in which any suitable fuel may be employed. I prefer to use petroleum as a fuel with any well-known or suitable atomizers and burners, by which it is discharged into the furnace and brought into a condition to be burned. The top of this chamber is provided with a large opening, through which the solid material may be introduced, this opening being fitted with a tightly-closing cover, as shown at C, Fig. 2. Within the lower part of the chamber is a coil of pipe D, through which steam from the boiler is caused to circulate, and in the upper part of the chamber and above the level at which the solid material stands is another coil of pipe E, which is intended to convey cold water or air or other refrigerating medium at the proper time.

In the center of the top of the chamber A is an opening with a stuffing-box, through which a shaft F passes vertically down, the lower end turning in a step, as shown at G.

H is a pipe leading from the benzine-tank I and discharging into the upper part of the chamber A, the supply being controlled by a cock in any suitable or usual way.

J is a pipe leading from the upper part of the chamber A to a condenser-coil at K.

L is a discharge-opening, through which the material may be drawn off from the tank when properly mixed.

The shaft F has fixed upon it the broad-bladed stirrers M M, with the blades radiating from the shaft and increasing successively in length until the longest one is just within the periphery of the coils. These blades serve to stir and intimately mix up the material in the lower part of the tank after it has been melted.

N are inclined scrapers at the bottom, and so fixed as to be turned by the shaft. These scrapers continually lift the material from the bottom of the tank and prevent its becoming burned by too great a heat applied below.

The operation of my invention will then be as follows: Sufficient of the solid paraffine or residue of distillation is placed in the tank A, so that when melted it will stand at or near the top of the steam-coil D. Heat is applied by means of the furnace B, below the tank, and also by steam which is injected through the coil D and circulates through the material until it is melted sufficiently to start the stirrers M. The shaft F is driven by a pinion, as shown at O, from a power-shaft

P, or by any other suitable or well-known means. As soon as the material has become sufficiently soft the stirrers and scrapers are started, and it is kept in agitation until it is thoroughly melted. When this has been effected, benzine is introduced into the upper part of the chamber, the stirrers keeping the melted material agitated and preventing it from being constantly cooled and hardened by the cooling action of the benzine. Various preparations of the two may be used. I have used with success a preparation of three hundred pounds of the solid material to one hundred gallons of benzine, allowance being made in introducing the latter for a considerable proportion which will be volatilized and carried off before the mixing can be completed. By means of the steam of the pipe D passing through the melted material, and with the assistance of the stirrers and scrapers, this melted material and the liquid benzine are intimately incorporated, and the melted material is prevented from hardening so as to form masses which cannot be mixed with the benzine or removed from the tank. The vapor which unavoidably arises from the volatilization of a portion of the benzine while the mixing is going on is conveyed away by the pipe J into the condenser K, which consists of a coil submerged in cold water or other refrigerating medium, the coil being of sufficient length to insure the condensation of the benzine, which discharges at the end of the coil and is received in any suitable receptacle, from which it may be again transmitted to the tank I and used again, so that no waste occurs. The mixing and agitation are carried on from ten minutes upward, depending upon the amount of material and the heat and pressure.

The condensing-coil, although open for the free passage of the benzine vapor and liquid, still produces a sufficient resistance to the free passage to keep up the pressure of several pounds within the chamber A, which raises the point at which the benzine volatilizes and maintains it in intimate relation with the melted material until the mixing can take place. In order to prevent further volatilization of the benzine after the mixing has been completed, a constant current of cold water, air, or other refrigerating medium is introduced into the coil E, which, passing through the upper part of the tank and above the level of the melted material, reduces the temperature of this portion of the chamber and prevents a further evaporation of the benzine. When sufficiently cold, the compound is drawn off through the opening at L and another charge introduced. By thus mixing these materials, subject to heat with a slight pressure, I am enabled to produce a compound which will remain in a limpid state and will not separate into its component parts when it becomes cold.

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

A mixer consisting of an exterior tank with a furnace beneath, a steam-coil surrounding the lower portion of the interior of the tank, and a refrigerating-coil similarly disposed in the upper part of the tank, a vertical rotary shaft extending downward through the center of the tank and having the mixing arms or blades of unequal length projecting radially therefrom, and the scrapers at the bottom, in combination with a supply-pipe, whereby benzine may be discharged into the tank, and a discharge-pipe and condensing-coil, substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

GEORGE W. SWAN.

Witnesses:
S. H. NOURSE,
H. C. LEE.