Nov. 12, 1940. A. G. WORTHING ET AL 2,221,318

PAINT REMOVAL

Filed Oct. 6, 1936

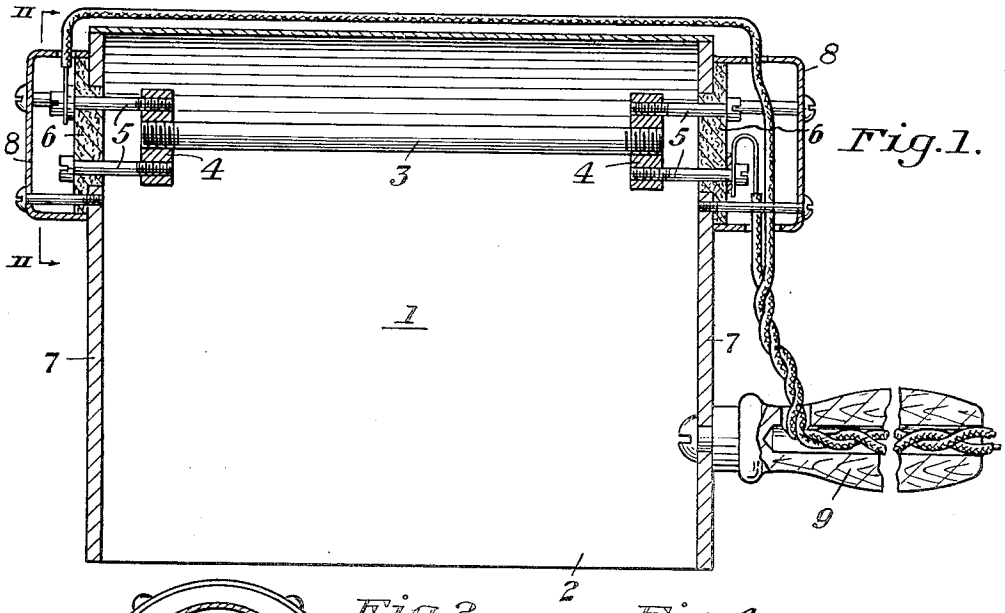



Fig. 1.

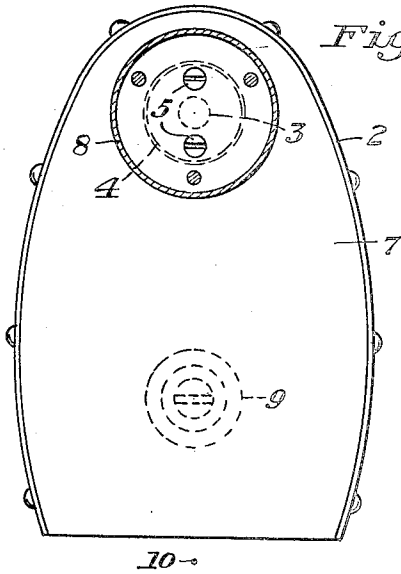



Fig. 2.

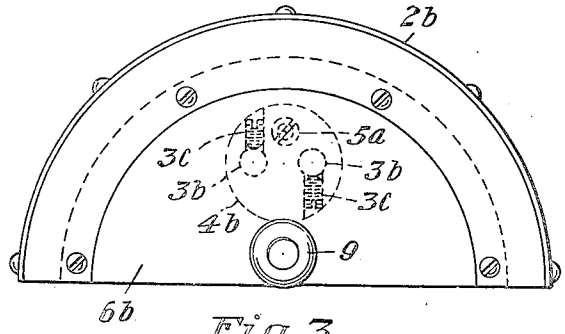



Fig. 3.

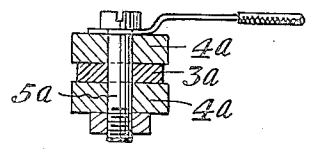
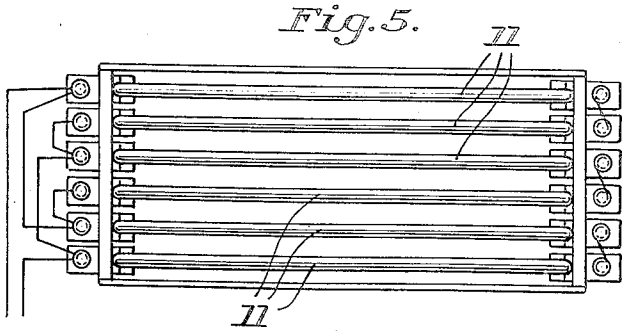



Fig. 4.

Fig. 5.

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Patented Nov. 12, 1940 2,221,318

# UNITED STATES PATENT OFFICE

2,221,318

## PAINT REMOVAL

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Application October 6, 1936, Serial No. 104,332

2 Claims. (Cl. 219—29)

Our invention relates to paint removal or loosening by means of radiant energy. In the drawing:

Figure 1 is a side elevation of a preferred form of a "sweeping field radiation unit" for paint removal;

Figure 2 is an end elevation, partially in section, taken along line II—II of Figure 1;

Figure 3 is an end section in elevation of a modified form of radiator element and mount therefor;

Figure 4 is an end elevation of another preferred form of unit; and

Figure 5 is a front elevation of a group unit which may be used with or without a housing or reflector, this being a modified form which we may use.

There are at present two commonly used methods for the removal of paint, namely, the chemical method and the combustion torch method. The chemical method is undesirable and somewhat dangerous on account of fumes developed, and for other reasons. The torch method is expensive on account of the time necessary for removal and somewhat unsatisfactory because the underlying wood is subject to some charring. Furthermore, there is an undesirable fire hazard when this method is used.

We have discovered that some of the drawbacks and troubles with such two methods may be overcome and a desirable method attained if radiant energy is used for the purpose of loosening the paint. The radiations in the visible and particularly—because of its relative abundance—in the infra-red regions are both valuable for this purpose.

In developing our invention, we found it preferable to have the radiant energy emitted by a high temperature source or radiator which is preferably elongated laterally so as to give a sweeping field yielding substantially uniform irradiation effects for a substantially uniform relative movement between the emitter and the surface from which paint is to be removed.

We also prefer to provide a properly shaped housing for the emitter with internal reflecting walls which should preferably have a cross section of the general form of a portion of an ellipse or a circle to concentrate the energy, although a radiator may be used with various shaped housings or without a housing. Such a device we shall term a "radiation unit". When this unit is used, the paint, loosened or much softened by the radiation, is actually removed by a putty knife or some similar scraping device as in the torch method.

Our preferred radiation unit consists of five parts—(1) a cylindrical housing, (*a*) with ends preferably plane and perpendicular to the length of the cylinder; (*b*) with sides whose cross section perpendicular to the length of the unit are preferably portions of an ellipse, a parabola, a circle or a combination of these shapes; (*c*) with internal surfaces preferably as highly reflecting as is practicable;—(2) an electrically heated rod, tube, ribbon or coil source or radiator which is of more or less uniform section and physical properties throughout its length, and is capable of yielding a high radiancy (i. e., radiant energy emission per unit radiating area); (3) means for mounting the radiator in the housing, which shall include insulation from the housing in case the housing is electrically conducting, and which shall be so shaped and located in case of the preferred forms of housing noted above as to permit of the radiator being located along or approximately along a line focus or axis of the housing; (4) means for permitting the electrical heating of the radiator; and (5) an attached handle for the convenient moving of the unit about.

In Figures 1 and 2, we show a preferred form of unit 1. In this form, a thin sheet of aluminum is bent to form approximately ¾ of a right cylinder or housing 2 of elliptical cross section. This elliptical housing is preferably highly polished on its inner surface and its outer surface is preferably covered with a black enamel. The black outer surface aids in keeping the housing as cool as possible by radiation of the energy which otherwise would heat up said housing to much higher temperatures. Within this housing and preferably at the focus line of the ellipse, is a radiator of semi-conducting material 3, which in form may be a rod, or coil or tube or ribbon, and which may be composed, for example, of silicon carbide, one form of which is sold under the name "globar."

At its ends, the radiator is removably fitted into central holes in two parallel and oppositely spaced iron discs 4, which are in turn mounted by bolts 5 on pieces of asbestos board 6; and these asbestos annuli fit into circular holes in aluminum end pieces 7. Protective caps 8 are removably secured to the end pieces 7. A handle member has been indicated by the numeral 9 and the focal point is indicated by the numeral 10.

These asbestos pieces mechanically support the radiator and insulate it electrically. At each end the globar rod is surrounded by a tight fitting

iron disc or annulus 4. These annuli serve as attached radiating bodies which lower the operating temperatures of the ends of the globar rod and as convenient leads to the radiator for the attachment of electrical supply wires.

In Figure 3, we have shown a modified form of radiator element 3a of flat, strip-like form. A pair of iron pieces or fingers 4a extend from an asbestos disc 6 at each end of the unit and support and electrically contact the element 3a at opposite ends thereof. A bolt and nut combination 5a removably secures the element 3a to the fingers 4a.

In Figure 4, we show another preferred form of a sweeping field unit in which the cross section of the housing is approximately a semi-circle within which the radiator, in this case two adjacent parallel "globar" rods 3b, is mounted more or less symmetrically to one side of the center of the iron discs 4b by set screws 3c. The end pieces 6b are of asbestos board. Otherwise, this is the same as Figures 1 and 2.

In Figure 5, we show a modied form of emitter or radiator without a housing. In this form, the radiator bars 11 are electrically connected and mounted in a suitable frame. They may or may not be electrically alive. This form is not, in our opinion, as desirable as the forms within housings.

In use, the preferred apparatus which we term "a sweeping field radiation unit," produces a highly concentrated or substantially focused and laterally elongated irradiation band, which is substantially uniform parallel to the length of the reflector and has a central strip of intense irradiation which fades gradually laterally in each direction. Much dependence for the rapid and satisfactory removal of paint is placed on these characteristics.

When used for paint removal, our preferred unit is preferably carried by the handle in one hand and moved in the direction perpendicular to the length of the unit over the paint to be removed, preferably in such manner that the line focus of radiation outside the unit falls on the painted surface or approximately thereon. The speed of movement will vary according to the type, color and thickness of paint. It will also depend on whether or not the paint is rapidly removed by a putty knife or similar device as it is treated. Such other device may be held in the other hand of the operator.

In practice, we have found in several tests that a dark or highly colored paint is more easily loosened or liquefied by the radiation than is a white paint. This accords with theory, in that the higher relative reflectivity and lower absorptivity of the white paint for radiation would lead to a lessened rate of heating of the paint, at least for radiation in the visible and near infra-red regions of the spectrum. For these reasons, paints of different colors will vary as to the times required to produce the temperatures where the paints which are being softened begin to bubble. Apparently this time will also vary inversely as the intensity of the irradiation.

In the case of a white or light colored paint, the time required for softening is found to be materially reduced if, before using our device to remove the paint, it should be covered with a cheap, quick drying, darkening or blackening coat of paint, varnish, shellac or some other dark, radiation absorbing material. This serves to overcome the high reflectivity of such white or light colored paint, and to reduce the time required for the paint removal.

Broader phases of the inventive disclosure are claimed in earlier filed, copending application or applications.

Many variations may be made in the form of emitter, housing, connections, etc., without departing from our invention, since we consider ourselves the first to discover the new property and value of radiant energy in the removal of the paint from different surfaces.

We claim:

1. In the removal of paint, the step consisting in covering the paint with a preliminary coat of higher absorptivity for radiant energy, and then subjecting the same to radiant energy.

2. In the method of removing paint, the steps consisting of generating a laterally elongated beam of infra red radiation adjacent and substantially parallel to the internal line focus of an elongated reflector, externally focusing the infra red radiation upon a paint covered surface, and causing relative movement between the paint and the focused infra red radiation while maintaining the paint coating substantially in focus.

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