F. W. MILLER.

METHOD OF CLEANING.

APPLICATION FILED SEPT. 25, 1914.

1,198,045. Patented Sept. 12, 1916.

Fig. 1.

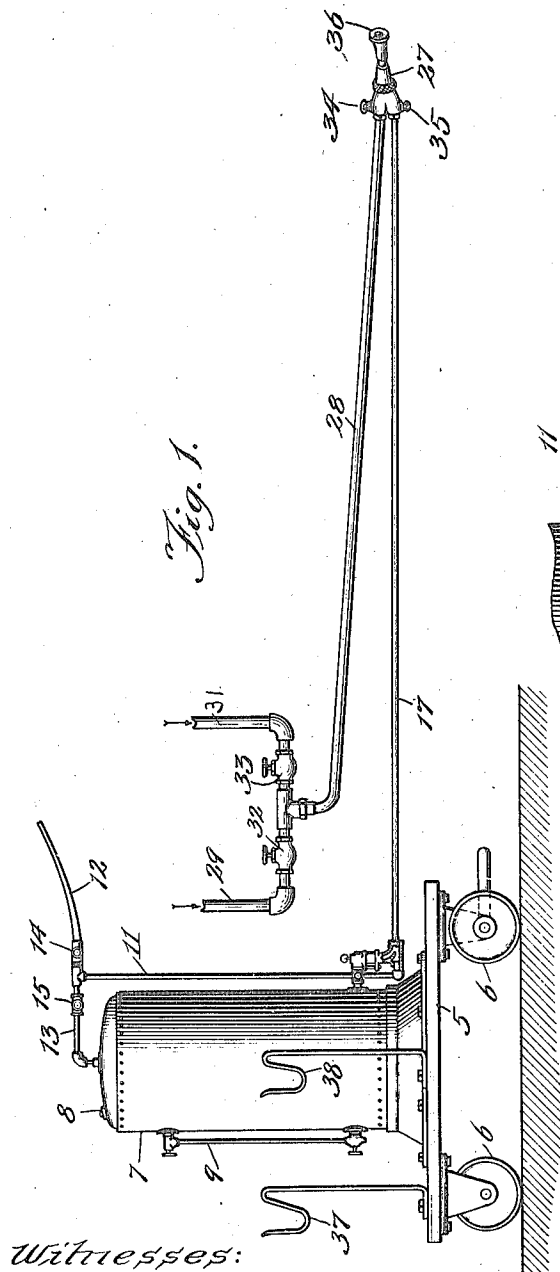
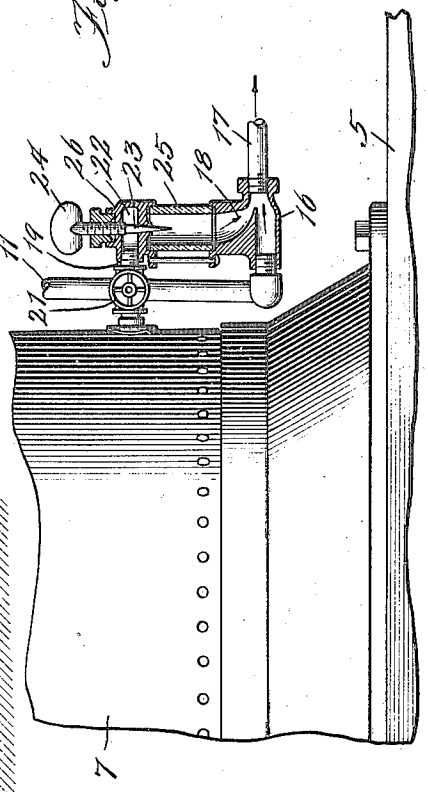



Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## METHOD OF CLEANING.

1,198,045. Specification of Letters Patent. Patented Sept. 12, 1916.

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*To all whom it may concern:*

Be it known that I, FRANK W. MILLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of Cleaning, of which the following is a specification.

This invention relates in general to method and means for cleaning, and has more particular reference to cleaning locomotives, automobiles, and other vehicles, upon the surface of which mud, oil, ice, etc., accumulate when the vehicle is in use.

One of the primary objects of the invention is to provide an effective method of speedily and economically removing this accumulation upon a vehicle, thoroughly cleaning the surfaces and applying a substance to the cleaned surfaces which will preserve the finish and prevent the parts from rusting.

Another object of the invention is to provide a method of cleaning in which the dirt, mud, and the like, will be removed by the impact or impingement of a multitude of small particles of liquid and air, or other gaseous or rarefied fluid under high pressure against the surface, which will cut, loosen and remove the undesirable accumulation without injurying the surface or marring the finish.

My invention will be best understood by reference to the following description when considered in connection with the accompanying drawings, throughout the various views of which like reference characters refer to similar parts.

Referring to the drawings, Figure 1 is a side elevation of an apparatus adapted to carry out my improved method, and Fig. 2 is an enlarged view partially in section of part of the apparatus shown in Fig. 1.

One form of apparatus for carrying my method into effect is mounted upon a portable truck adapted to be trundled about from place to place and comprises a platform 5 carried by suitable wheels 6. Upon the truck I have mounted a closed container or receptacle 7 adapted to contain a cleansing fluid such as kerosene, gasolene, liquid soap or oil of a suitable character, the liquid to be employed in this container depending, of course, upon the particular use to which the apparatus is to be put. A removable cap 8 is adapted to normally seal the opening through which the liquid is introduced into the container, and a sight glass or gage 9 shows the height of the liquid in the container.

A fluid or gas supply pipe 11 is disposed adjacent to the container, its upper end being provided with a T, one branch of which is equipped with a hose 12 adapted to be connected with any suitable source of fluid or gas under pressure. Air under pressure will be customarily employed for the reason that most round houses are equipped with air pressure and are provided in convenient locations with drops to which the end of the hose 12 may be readily connected although steam or other rarefied fluid under pressure might be employed in some instances with very good results. Garages also have air pressure systems and my apparatus may be employed in any place where suitable fluid pressure may be obtained. A branch pipe 13 leads from the T to the top of the container 7 for the purpose of supplying the container with air under pressure in order that the liquid in the container may be fed therefrom in a manner which will be later described. A hand valve 14 is provided in the branch to which the hose 12 is connected by means of which the air pressure may be totally shut off when desired, and a similar hand valve 15 in the branch pipe 13 may be used to shut off the air pressure to the container when it may be desirable to use the system without using the liquid in the container.

The lower end of the pipe 11 is connected with a coupling 16 shaped as shown in Fig. 2 to provide a horizontal passage through which the stream of air passes to a hose 17 connected therewith and also an inclined passage 18 opening into the horizontal passage at an angle through which the liquid fed from the container is drawn into the air conduit and thoroughly atomized or mixed with the air. The liquid is withdrawn from the container through a pipe 19 equipped with a hand valve 21 which may be closed to shut off the liquid supply when desired. From a pipe 19 liquid is discharged into a chamber 22 provided in its lower wall with a tapered opening adapted to be closed or partially closed by a needle valve 23 equipped with a knob or operating portion 24, by means of which the valve may be adjusted. The sight glass 25 is pref-

erably interposed between the casting 26 formed in the chamber 22 and the coupling 16 forming the passage 18, so that the amount of liquid being fed from the container to the air conduit may be observed.

The air conduit 17 which is preferably of flexible hose is connected at its free end with a spray nozzle 27 provided with twin nipples to which the hose 17 and a water hose 28 are respectively connected. The other end of the water hose is attached to any suitable source of water supply and in the present instance I have shown for purposes of illustration the hot and cold water drops 29 and 31, respectively, of a round house, these drops being customarily located adjacent each locomotive pit. The drops in the present instance are shown as connected together to deliver tempered water to the hose 28, the temperature of the water being regulated by manual manipulation of the hand valves 32 and 33, as will be readily understood. The relative proportions of water from the hose 28 and air and liquid from the hose 17, delivered to the nozzle 27, may be regulated by hand valves 34 and 35. The water from the hose 28 and the air and liquid from the hose 29 will be thoroughly mixed in the nozzle and discharged therefrom in finely divided streams, the size of which may be regulated by turning the adjusting sleeve 36 in one direction or the other, or any other preferred type of spray nozzle suitable for the purpose may be employed if desired. In practice the stream is caused to impinge at a high velocity against the surface to be cleaned; the stream containing the oil in a state of extremely fine sub-division in an excess of water.

When the apparatus is not being used the hose 12 is disconnected from the air supply and coiled up on the holder 37, and the water hose 18 is disconnected from the water supply and together with the air hose 17 is coiled up on the holder 38. The apparatus, which occupies but little space, may be stored in any convenient location, and when it is desired to use the same it may be readily trundled by hand to the desired location whereupon the hose 12 will be connected to the air supply and the hose 18 will be connected to the water supply.

My method as practised by means of the above described apparatus is substantially as follows: The air under considerable pressure, preferably 60 to 75 pounds, flows through the pipe 11 and through the hose 17 with considerable rapidity. To prevent the air from backing up in the feed passage 18 and interfering with the feed of the liquid from the container the liquid in the container is maintained under the same air pressure through the branch pipe 13. Liquid from the container therefore flows past the needle valve 23, which is adjusted to give the required feed, and as it is drawn through the inclined passage 18 by the injector action of the rapidly traveling stream of air it is atomized and thoroughly mixed with the air and carried along thereby through the hose 17 to the mixing and delivery nozzle 27. The air therefore is thoroughly impregnated with the liquid from the container when it reaches the nozzle, and the water which is admitted to the nozzle through the hose 28 is thereupon thoroughly mixed with the air and its suspended liquid. The resultant mixture is then discharged from the nozzle in minute streams under a high pressure so that the particles of water, liquid and air impinge upon the surface to be cleaned with sufficient force to cut, loosen and dislodge the mud and other material which it is desirable to remove therefrom. The liquid in the container, as has been previously stated, will vary to suit the requirements of the surface which is to be cleaned. In cleaning automobile bodies liquid soap or gasolene might be employed. For cleaning the exterior and running gear of locomotives, however, it is found desirable to employ a heavier oil, which not only aids in cutting the grease, mud, etc., clinging to the locomotive, but also serves to leave a thin film of oil over the parts which have been cleaned, which film prevents the parts from rusting and obviates the common and heretofore necessary practice of wiping the locomotive off with oil waste. It has been found that the elimination of the wiping operation alone on boilers effects a saving of about forty cents on each boiler each time it is cleaned.

The quantity of oil or cleaning fluid may be regulated through the needle valves, as has been previously described, and in many instances it will be found desirable at the end of the cleaning operation to cut down the proportion of water by closing or partially closing the valve 34 so that more oil will be delivered at the end of the operation to form a film over the cleaned surface. The high pressure at which the oil, water and air are delivered from the nozzle is very effective mechanically in removing the mud, etc., while the action of the oil or cleansing liquid attacks the grease and assists in loosening it, thereby facilitating the cleaning operation. The process may be effectively carried out with cold water but in many instances, particularly in the winter when the vehicle is coated with ice, sleet, frozen mud and the like, it will be found that hot or warm water will materially assist and shorten the cleaning operation.

It is believed that my method and one preferred means for carrying the same into effect will be readily understood from the foregoing without further description, and

it should be obvious that considerable variation in details of construction and operation may be resorted to without departing from the scope of this invention.

I claim:

1. A method of cleaning surfaces, which comprises sub-dividing oil by subjecting it to the action of a gaseous fluid under pressure, commingling the oil while in a state of sub-division in an excess of said fluid with a stream of water, and causing the commingled streams to impinge at high velocity against the surface to be cleaned.

2. The method of cleaning surfaces, which comprises sub-dividing oil by subjecting it to the action of a rarefied fluid under pressure, commingling the oil while in a finely sub-divided state in an excess of said fluid with a stream of water under pressure, and causing the commingled streams to impinge at a high velocity against the surface to be cleaned.

3. The method of cleaning, which consists in passing a stream of gaseous fluid under pressure past an oil supplying aperture to incorporate a quantity of oil with the fluid and to finely subdivide the oil, mixing a quantity of water with said fluid and oil mixture, and causing the resultant mixture to impinge under high pressure against the surface to be cleaned.

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