Oct. 17, 1961 J. R. RUSHMER 3,004,273

APPARATUS FOR CLEANING RAILS

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Fig. 1

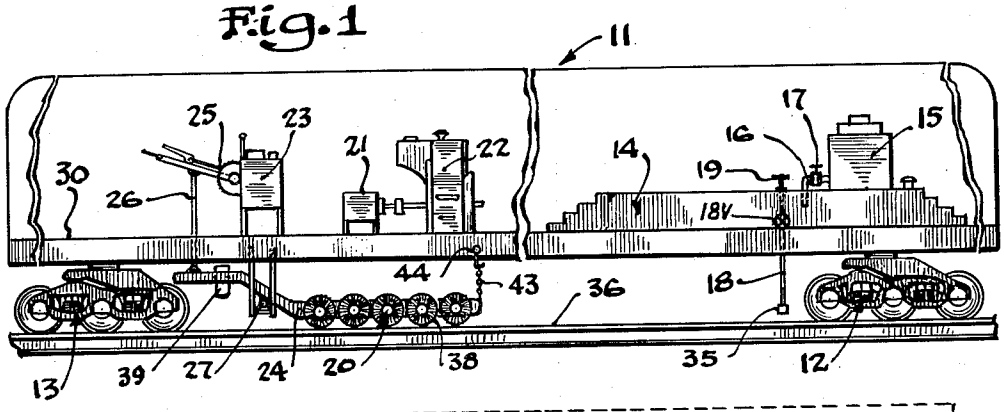


Fig. 4

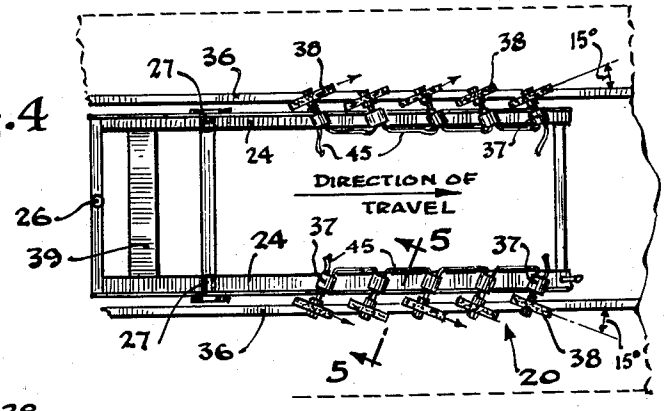
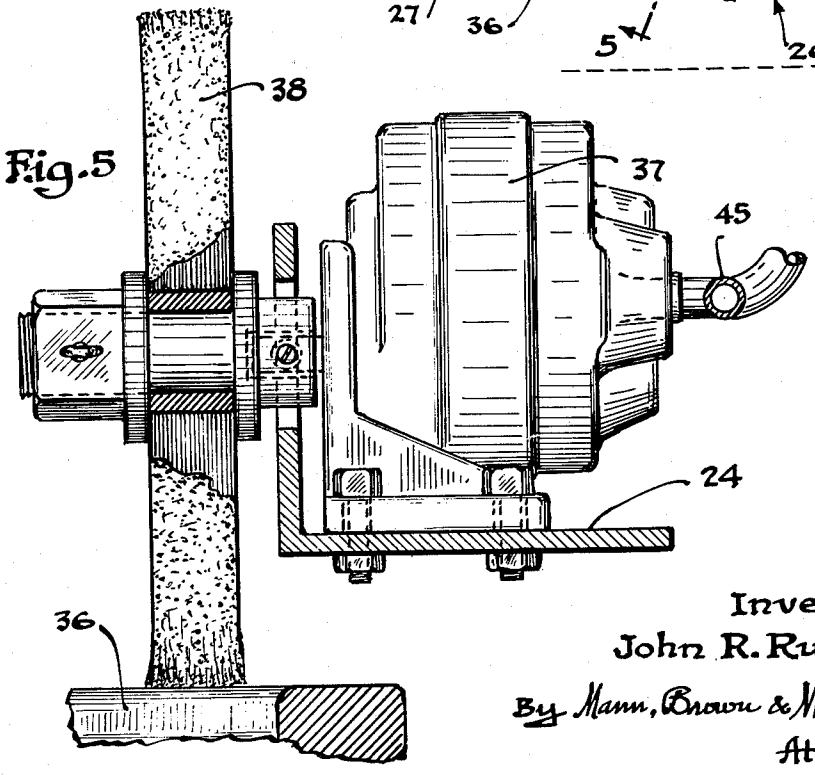


Fig. 5



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APPARATUS FOR CLEANING RAILS

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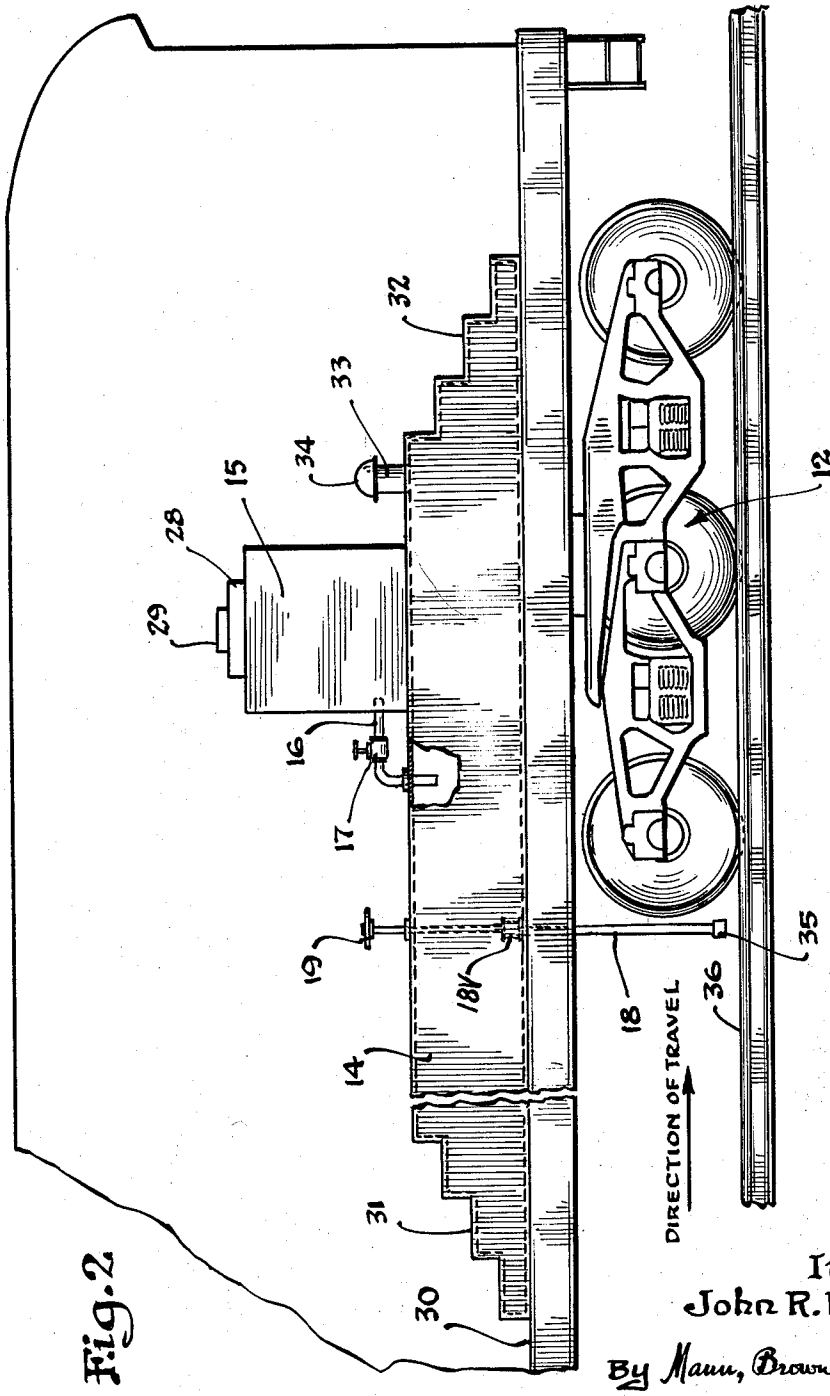


Fig. 2

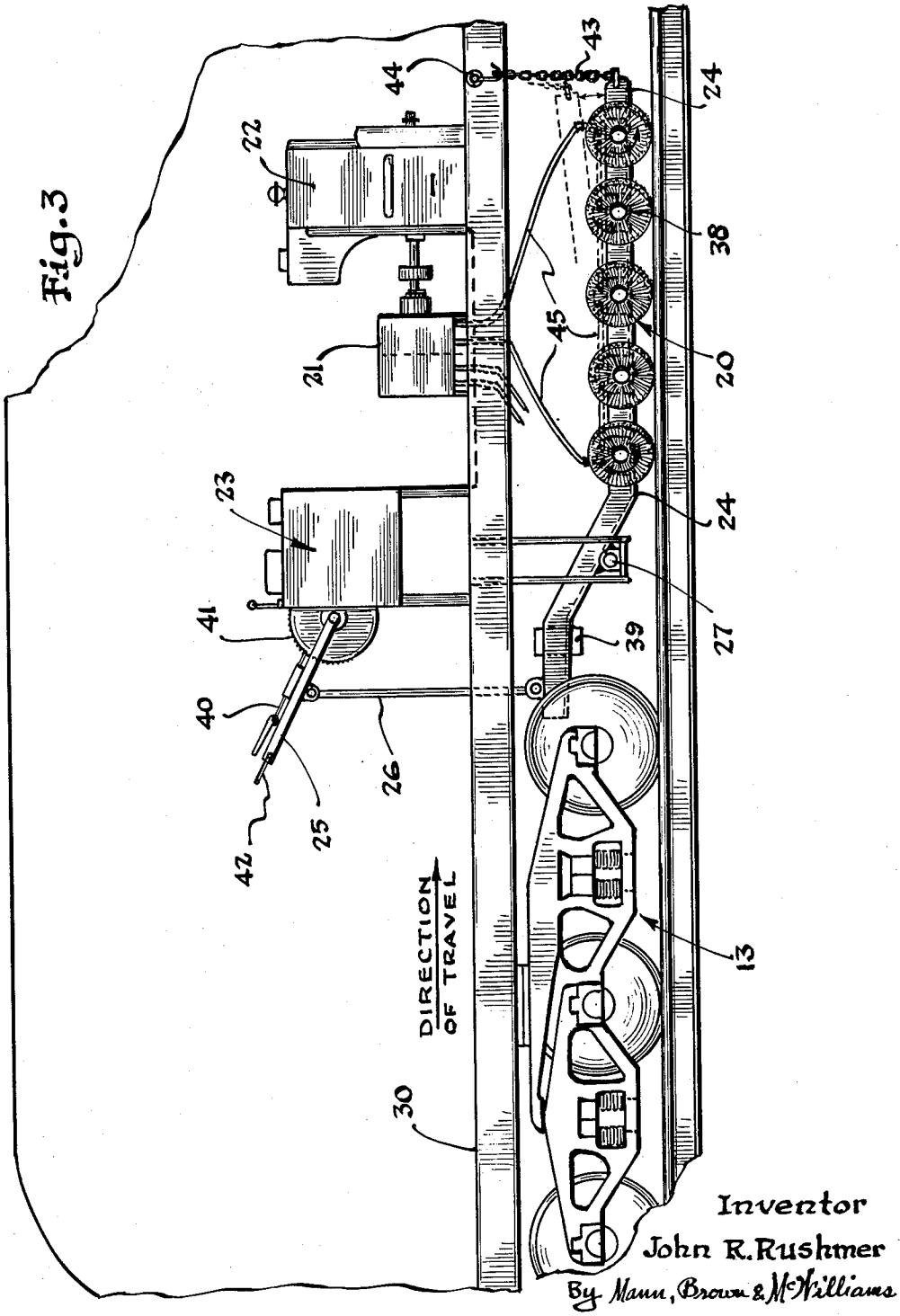
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APPARATUS FOR CLEANING RAILS

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Fig. 3



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APPARATUS FOR CLEANING RAILS

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3 Claims. (Cl. 15—55)

This invention relates to apparatus for cleaning the running surface of track rails.

The unavoidable deposition of oil and other lubricants and foreign matter on the running surface of track rails gives rise to problems long recognized in the railroad industry. These deposits cause reduced traction for braking, increased slippage, burned or otherwise damaged rails, and damage to generators, traction motors and pinions.

In addition to the physical damage to transportation equipment, the presence of unwanted lubricant film on rails, especially on grades or curves, may prevent the effective control and stoppage of self-propelled "on track" motor cars and maintenance equipment. This impairment of normal operations may promote accidents and even endanger life. The deposits of lubricants have not only undesirable mechanical effects but have also been known to impair the functioning of signal circuits, thereby increasing the possibility of accidents and causing delays.

The vexing problem of lubricant deposition on track rails is one which has plagued the railroad industry for many years. Notwithstanding concerted efforts and considerable research directed toward solving this problem, no satisfactory answer has heretofore been proposed. If anything, the difficulties have become more pronounced because of factors tending to increase the rate of deposition of oils and grease on track rails. An example of such a contributing factor is the general replacement of steam locomotives by diesel engines.

Greater distances between stops for inspection, servicing, and lubrication of locomotives and cars have prompted the use of larger quantities of lubricants at each service point, especially in car truck and locomotive driving boxes, in locomotive generator bearings, traction motor bearings and pinions, and in drive gears. During the course of travel, some of the lubricant drips from the point of application and some is thrown off by centrifugal force. In both cases, at least a portion of the lubricant reaches the running surface of the track rail and turnout parts.

Sand has found extensive use as a means for reducing slippage on track rails. Locomotives are generally equipped with "sanders" consisting of tanks containing dry sand with suitable particle-size distribution and having free-flow properties. In use, the sand is piped to and applied to the top of the rail immediately ahead of the lead driving wheels. The friction coefficient between wheels and rail is thereby increased and slippage reduced.

The use of sand for this purpose requires that sand plants be established and maintained at convenient locations, where sand can be unloaded from cars, dried, and placed in dry storage for ultimate delivery into the sand tanks of locomotives and heavy on-track work equipment. The maintenance and operation of sand stations requires considerable manpower, equipment and supplies, in addition to the expense of conducting the work.

The frequent application of sand to the running surface of rails has some undesirable effects. For example, on heavy grades where sand is used by most of the passing trains, the ballast becomes fouled and the rail joints collect sand which causes wear over and above normal and destroys, to some extent, the benefits of rail joint lubrication.

Other approaches to the solution of this problem have proved unsuccessful, in some cases because of impracticability, in others because of prohibitive costs. Until the present, no satisfactory solution has been devised.

The present invention has for its principal object to provide apparatus for removing lubricants and other foreign matter from the running surface of track rails. The procedures disclosed are not only practical but economical.

A principal advantage of the technique of this invention is that the materials and equipment used in performing the cleaning operation are transported on standard types of railroad cars and the cleaning operation itself is conducted while the car proceeds over the rails at regular train speeds.

According to this invention a chemical cleaning composition is applied to the running surface of the track rails and then the cleaner, together with the foreign deposit on the rail, is wiped from the running surface by rotating brushes having angular velocity sufficient to throw the cleaner and the foreign deposit from the rail and from the brushes toward the field edge of the rail.

An important feature of this invention resides in the fact that the application of the cleaner and the final wiping operation are carried out continuously and progressively while the railroad car on which the cleaning equipment is carried proceeds over the rails at regular train-operating speeds.

In a preferred embodiment of this invention, there is provided a finite time interval between the application of the chemical cleaner and its subsequent removal by the wiping operation.

In addition to the convenience, utility, and overall effectiveness of the cleaning technique disclosed herein, there are the additional important advantages of economy of operation and safety. The chemical products used in formulating the cleaning compositions are low in cost, easily and safely handled, non-irritating, free from fumes, and practically non-corrosive. The detergent itself is not only low in cost but is used effectively at low concentrations.

Other objects, uses and advantages wil be obvious or become apparent from a consideration of the following description and the accompanying drawings.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same.

FIG. 1 is a side elevation of a rail-cleaning car embodying my invention, with the car side wall broken away to facilitate disclosure of the operative elements;

FIG. 2 is an enlarged side elevation of the forward portion of the railway car of FIG. 1;

FIG. 3 is an enlarged side elevation of the rear portion of the railway car of FIG. 1;

FIG. 4 is a plan view of the rear portion of the railway car disclosing the angular position of the cleaning brushes with respect to the rails; and

FIG. 5 is a detail of the mounting of the motor and brush assembly and is taken on the line 5—5 of FIG. 4.

Referring now to FIG. 1, numeral **11** indicates generally a railroad car intended for connection in a freight train for operation during travel of the train. Preferably this car is connected immediately forwardly of the caboose. In a preferred embodiment of my invention illustrated herein for purposes of disclosure, the railroad car is 80 feet in length and has a six-wheel truck **12** at its forward end and a six-wheel truck **13** at the rear. A solution-storage tank **14** is positioned on the deck of the railroad car toward the forward end. A chemical tank **15** is mounted on the solution-storage tank.

A pipeline **16** connects the chemical tank to the solution-storage tank. The transfer of materials from the chemical tank to the solution-storage tank is controlled and regulated by a valve **17** in the pipeline **16**. The cleaning solution in the solution tank **14** is supplied to

the rails through other pipelines 18 under the control of valve-operating handles 19.

Near the rear portion of the railroad car are shown the driven brush assemblies 20 and the driving and positioning apparatus for the brush assemblies. This apparatus includes a double hydraulic fluid pump 21, an engine 22 (gasoline or diesel) for driving the hydraulic pump, and a hydraulic fluid storage tank 23. These components are used to power the hydraulic motors which are connected to and drive each of the brushes. The brush assemblies 20 are raised and lowered by means of a supporting mounting arm 24 actuated through levers 25 and 26 and pivoting at a hinge 27.

A more detailed representation of a preferred embodiment of the apparatus for handling the chemical-cleaning solution is depicted in FIG. 2 representing the forward portion of the rail-cleaning car.

The chemical tank 15, with a capacity of about 280 gallons and fitted with a top filler opening 28 and cover 29, is mounted on top of the solution-storage tank 14. The chemical tank 15 is rubber lined; but, depending upon the materials of construction and the nature of the chemicals to be stored in the tank, other protective coatings may be suitable, or no coating at all may be required. A pipeline 16 connected near the bottom of the chemical tank is connected at its other end to deliver material into the solution-storage tank. The flow of material from the upper chemical tank 15 to the lower solution-storage tank 14 is controlled by a valve 17 in the connecting pipeline 16.

In the particular preferred embodiment shown, the solution-storage tank 14, having a capacity of about 5,200 gallons, rests on the deck 30 of the car, is about 30 feet in length, and at its opposite ends is provided with step structures 31 and 32 to facilitate access to the control equipment during loading and adjustment operations.

Convenient access to the interior of the solution-storage tank for filling is provided by the ports 33 located outside and on each side of the car. Each outside port is fitted with a suitable tank filler cap 34.

The pipelines 18 terminate in nozzles 35 positioned about 1½" above the running surfaces of the rails 36 for delivering cleaning solution from the solution-storage tank 14 to the rails, and separate control valves 18V actuated through the extension handles 19 readily accessible at the top of the solution-storage tank regulate the solution-flow rate to each rail. As indicated in FIG. 2, the nozzle 35 delivering cleaning solution to the running surface of the track rail 36 is located adjacent to and to the rear of the front truck 12 of the car. In the railroad car shown, a six-wheel truck 12 is used at the forward end of the car to improve stability and to ensure adequate support for the high concentration of weight at that location.

The motor-driven cleaning brush assemblies 20, together with the associated driving and positioning apparatus, are located toward the rear of the railroad car and are depicted in FIGS. 3, 4 and 5.

In the illustrated preferred embodiment of my invention, series-connected hydraulically powered motors 37 (FIG. 5) are used to drive the cleaning wheels or brushes 38. That is, the hydraulic motors on a given side are series-connected. There is a parallel relationship between the two banks of motors serving the two rails of the track. The cleaning wheels 38 are 12" in diameter and 2" wide, this being a convenient though not a critical size. They are preferably comprised of wire bristles.

Each wire bristle cleaning wheel is preferably driven by its own hydraulic motor. Although other types of drives could be successfully employed, the particular motors used have been selected because of their dependability in service and because they are well sealed and thus do not aggravate the problem of oil or lubricant deposition on the running surfaces of the rails.

The wire brush wheels 38 and the fluid motor assemblies 37 on a given side of the cleaning car are mounted on a supporting arm 24 which is above and parallel to the rail. The assemblies 20 are mounted so that each brush is at an angle of approximately 15° with respect to the vertical plane of the mid-width of the rail, as shown in FIGS. 4 and 5. The direction and speed of rotation of the cleaning wheels are such that the material removed from the running surface of the rail is thrown toward the field side of the track. The speed of angular rotation of the wire cleaning brush is preferably in the order of 1,000–1,500 r.p.m., a velocity sufficient to throw the cleaner and foreign deposits from the rail surfaces and from the brushes. The arm supporting the cleaning wheel and motor assemblies is mounted on a hinge 27 and balanced with a counterweight 39 so that the cleaning wheels can be elevated above and out of contact with the rail when not in use. The associated mechanism includes a brush-positioning lever 25 pivotally connected to a frame structure mounted on the deck of the cleaning car. When the brush is lowered, it acts through a linking arm 26 to exert force on the supporting arms 24 for the brush assemblies thereby causing the supporting arm to pivot at the hinge 27 and raise the brush assemblies 20 up and out of contact with the rails 36.

A latch 40 on the brush-positioning lever 25 engages a notched quadrant 41 to lock the brush-positioning arm and its associated linking arm 26 and the support arm 24 in the raised position selected. A ring 42 holds the latch disengaged from the notched quadrant 41 permitting the brushes to contact and rest upon the running surface of the rail during the energization of the hydraulic motors 37.

A safety chain 43 connected to the other end of the supporting arm is fastened to a hook 44 for holding the brush assemblies 20 up and out of contact with the rail surfaces when the car is not being used for rail-cleaning purposes.

The hydraulic motors 37 used to drive the cleaning wheels 38 are fed by hydraulic lines 45 from the double hydraulic fluid pump 21 mounted on the deck 30 of the cleaning car.

Operation

It is an important advantage that the operation of the rail-cleaning car is quite simple. The aims of the procedure to be described include the preparation of a cleaning solution of the desired concentration, delivery and application of the solution to the running surfaces of the track rails, and removal of the solution, together with the foreign deposit from the rail surfaces.

A detergent or wetting agent concentrate is filled into the chemical tank 15 through the top filler opening 28. Some latitude exists in the selection of the particular chemical product to be used. Several classes of materials including anionics and non-anionics as well as specially formulated products may be suitable. The concentration of chemical agent in the final working solution will be dictated by the properties of the particular product selected. It has been found that a one percent solution of an anionic detergent such as an alkyl-aryl sulfonate, for example, Alkanol DW (Du Pont), is a satisfactory formulation. Lix No. 22 cleaner, or Lix No. 350 cleaner (The Lix Corporation, Kansas City, Missouri) is also suitable. Non-ionics, such as polyoxyethylene derivatives of nonyl phenol, e.g., Makon 10 (Stepan Chemical Co.) are also satisfactory; and many other types of detergents or wetting agents can be used successfully.

The working solution is prepared by adding the requisite amount of the chemical concentrate to the water previously filled into the solution storage tank 14. For example, sufficient concentrate can be added to the solution tank to make a final one percent detergent concentration. In the particular equipment depicted, the solution-storage tank has a capacity of about 5,200 gallons. Thus, about 52½ gallons of a detergent concentrate of 100 percent activity would be required to make a final one percent working solution. Transfer from the chemi-

cal tank 15 to the solution tank 14 is through the pipeline 16 connected near the bottom of the chemical tank 15 and is controlled by means of the valve 17 in the line. Any suitable measuring technique may be used in meting out the concentrate. Mixing of the contents of the solution-storage tank may be by stirring motors, circulation pumps or other means, although it has been found in practice that adequate mixing occurs when the concentrate is merely allowed to flow into the solution tank.

The working solution is delivered to the running surface of the rail 36 by pipelines 18 terminating in nozzles 35 positioned just above the rails. Flow is regulated by means of control valves 18V actuated through extension handles 19 that extend above the top of the solution-storage tank 14. The rate of delivery may be measured by any suitable technique.

Using the particular preferred embodiment of the invention depicted and described, it has been found that satisfactory cleaning is achieved by using about ¾ of a gallon of prepared solution per mile of rail or 1½ gallons per mile of double track. These results are for a one percent-solution of an alkyl-aryl sulfonate applied while the cleaning car traverses the track at 60 m.p.h. Other types of cleaners, including pastes and solids or powdered compositions, may be used. These may be applied by means of rotating brushes.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that it will occur to those skilled in the art that variations, changes, and modifications may be resorted to without departing from the spirit of the subjoined claims.

I claim:

1. A rail cleaning car adapted to be connected into a train for operation at normal train operating speeds and equipped with a chemical cleaner and apparatus for applying the chemical cleaner to the running surface of both rails of a track and for removing such cleaner together with foreign deposits from the rails' running surface during the normal operation of said train, said car including conventional multiple axle front and rear freight car trucks and having means for storing said chemical cleaner, one or more rotatable cleaning brushes for each rail, mounting means for supporting said brushes in wiping contact with the rail surfaces at a point adjacent and forward of the rear truck with said brushes oriented to wipe the rails in a direction extending generally forwardly but angled somewhat to one side with respect to a vertical plane lengthwise of said rail, means for applying said cleaner to the running surface of each rail at a point in advance of said brushes, and motor means for driving said brushes at high angular velocity while in wiping contact with said running surface of the rail to remove applied cleaner, together with any foreign deposits, from the rail surface and throw the same generally in the direction of travel of the car but to said one side of the rail.

2. A rail cleaning car adapted to be connected into a train for operation at normal train operating speeds and equipped with a chemical cleaner and apparatus for applying the chemical cleaner to the running surface of a rail and for removing such cleaner together with foreign deposits from the rail's running surface during the normal operation of said train, said cleaning car having conventional front and rear freight car trucks and including a chemical cleaner storage means, conduit means for delivering cleaner from the storage means to the rails' running surface at a point adjacent the rear of the front truck, dispenser means for controlling supply of cleaner from said storage means to said conduit means, rotatable cleaning brushes having peripheral wiping surfaces, mounting means for bringing said cleaning brushes into wiping contact with the rail surface at a point adjacent and forward of the rear truck, motor means for driving said cleaning brushes at high angular velocity while in wiping contact with said running surface to remove applied cleaner together with any foreign deposits from the rail surface, said motor means driving said brushes in a direction of rotation such that the wiping surfaces move along the rail in the general direction of travel of the car, said mounting means orienting said brushes at an angle with respect to the rail to throw the applied cleaner and any foreign deposits to the field side of the rail, and the linear separation between said points being sufficient to permit adequate time between application and removal for the cleaner to act upon the foreign deposits and to facilitate thereby the effective cleaning of the rail surface by the brushes.

3. A rail cleaning car as set forth in claim 1 in which the rotatable brushes on opposite sides of the track are mounted on a carriage, and means for lowering and raising the carriage to and from operative position respectively.

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