July 25, 1961 M. W. KISTLER 2,993,669

RAILROAD EQUIPMENT

Original Filed Feb. 16, 1954 3 Sheets-Sheet 1

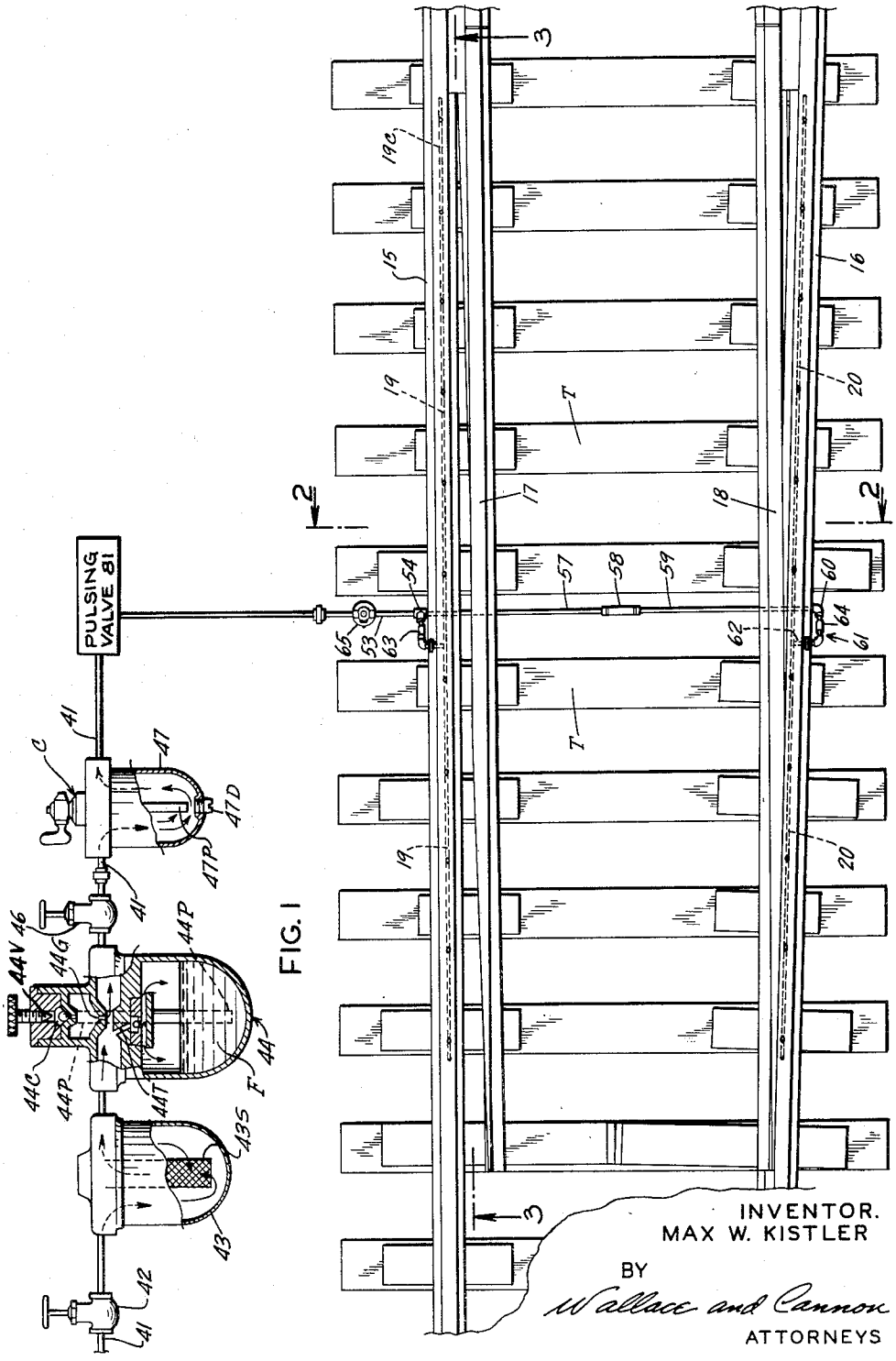

FIG. 1

INVENTOR.
MAX W. KISTLER

BY
Wallace and Cannon
ATTORNEYS

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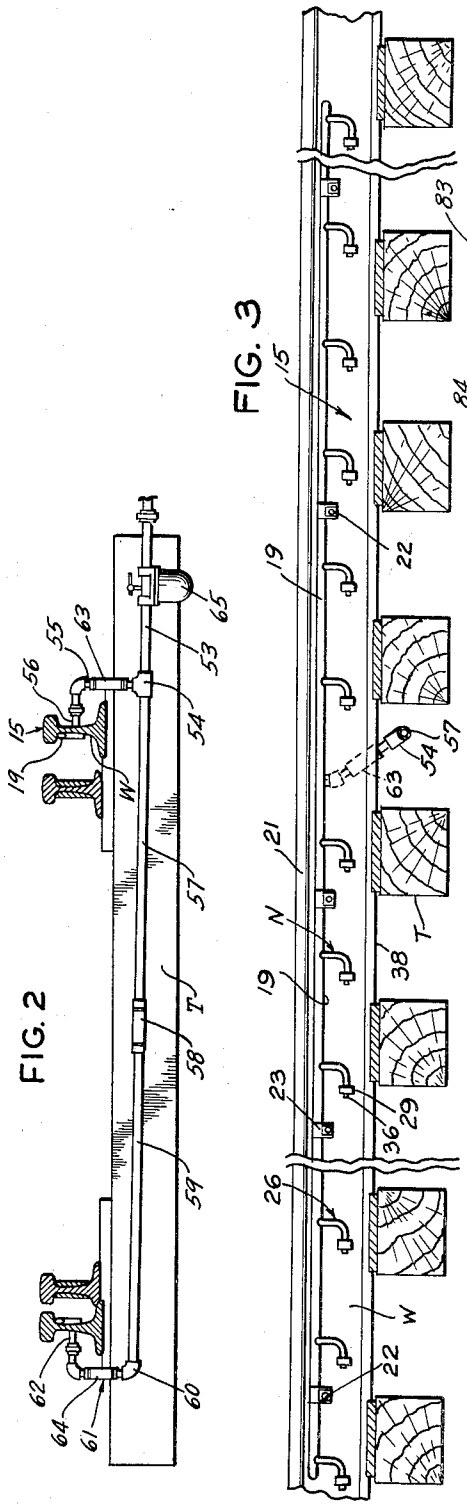
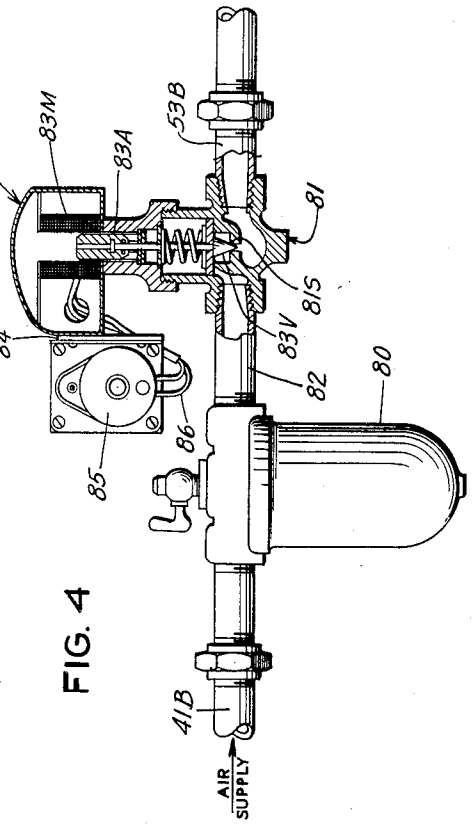
RAILROAD EQUIPMENT

Original Filed Feb. 16, 1954 3 Sheets-Sheet 2





INVENTOR.
MAX W. KISTLER

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Wallace and Cannon

ATTORNEYS

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Original Filed Feb. 16, 1954 3 Sheets-Sheet 3

FIG. 5

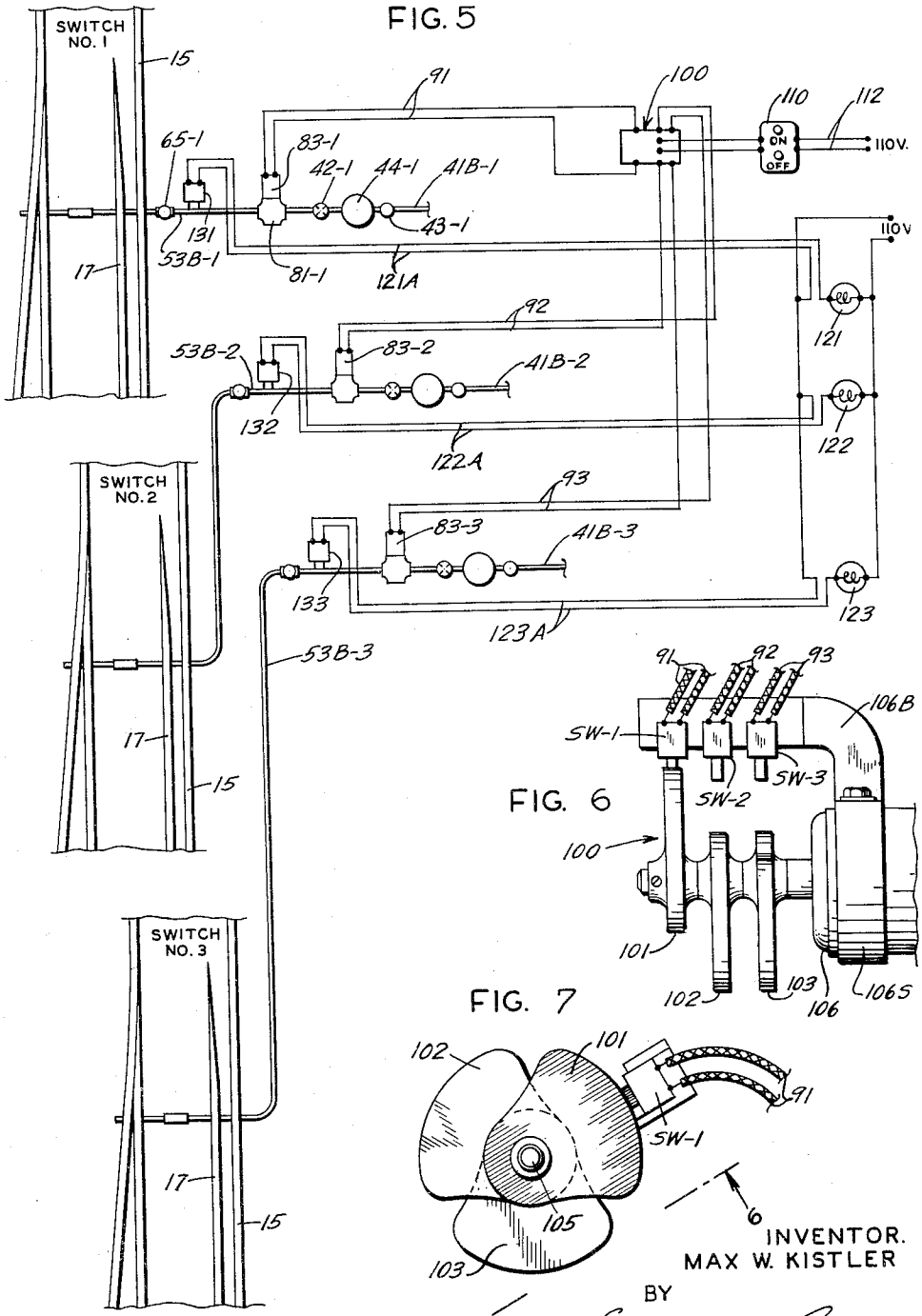

FIG. 6

FIG. 7

INVENTOR.
MAX W. KISTLER
BY
Wallace and Cannon
ATTORNEYS

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2,993,669

RAILROAD EQUIPMENT

Max W. Kistler, Penfield, N.Y., assignor to American Brake Shoe Company, New York, N.Y., a corporation of Delaware

Original application Feb. 16, 1954, Ser. No. 410,557. Divided and this application Oct. 24, 1958, Ser. No. 769,372

2 Claims. (Cl. 246—428)

This invention relates to blowers for maintaining railway switches free of snow, debris and the like.

The successful operation of a railway switch is often impeded by accumulations of snow, debris and the like which packs between the stock rail and the switch point, such that the latter cannot engage during operation of the switch. Therefore, if a proper functioning of the switch is to be attained during inclement weather or other natural conditions giving rise to accumulations of debris between the switch point and the stock rails, it is necessary to provide the switch with a means for maintaining the same free of such obstructions. In the past, such means have either been in the form of electrical resistance elements mounted on one of the rails for melting snow and ice, or a set of open gas flames arranged at the switch for the same purpose. However, operation of these prior devices is inherently accompanied by the melted snow or ice flowing in a stream to another point where freezing again occurs. This, it will be seen, is but a partial solution to the problem. Moreover, where electrical resistance elements are used, the system is somewhat delicate and subject to reoccurring malfunctions, and where gas flames have been resorted to, these are many times accidentally extinguished. In addition, open gas flames in any event represent a fire hazard and are likely to cause over-heating of adjacent switch parts.

Other arrangements have also been suggested but such have not been utilized commercially because they do not embody any practical means of control.

The primary object of the present invention is to permit railway switch installations to be maintained free of snow, debris and the like by means of a pneumatic blower which possesses none of the objectionable features of the prior art devices mentioned above. A further object of this invention is to permit railway switch installations to be maintained free of snow, debris and the like by means of a pneumatic blower which can be operated by remote control and in which intermittent pulses of air under pressure are directed to the switch in an accurately timed relation that may be preselected in accordance with the weather conditions to be reckoned with.

Other objects of the present invention are to permit railway switches to be maintained clean by means of a relatively inexpensive pneumatic blower apparatus; to reduce mechanical hazards at railway switch installations that have heretofore been inherent in switch cleaners of the prior art; and to eliminate the need for manual labor for policing railway switch installations during inclement weather.

Another object of the present invention is to construct blower apparatus that can easily be associated with a plurality of switches at a railroad terminal or classifying yard where many railroad switches are located in a particular area.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments

of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a plan view of a railway switch with which the novel blowing apparatus for the present invention is associated, wherein certain of the kindred apparatus associated therewith are partially diagrammatically illustrated without regard to scale;

FIG. 2 is a transverse sectional view taken substantially on the line 2—2 of FIG. 1;

FIG. 3 is a longitudinal sectional view taken substantially on the line 3—3 of FIG. 1;

FIG. 4 is a view showing the form of control apparatus for furnishing pulses of air;

FIG. 5 is a partially diagrammatic plan view showing the arrangement to which resort may be advantageously had in an instance where the novel blowing apparatus of the present invention is employed in association with a plurality of switches;

FIG. 6 is a fragmentary detail view of the timer **100** which is only schematically indicated in FIG. 5;

FIG. 7 is a view looking at the end of the timer shown in FIG. 6.

In the accompanying drawings, a track arrangement is shown in FIG. 1 including the usual stock rails **15** and **16** that have switch points as **17** and **18** associated therewith adapted to be actuated by conventional means for purposes well understood in the art. In the present instance, the novel blowing apparatus of the present invention for maintaining the space between the rails free of snow, debris and the like includes a pair of elongated manifolds **19** and **20**, FIG. 1, for compressed air that are respectively mounted on the stock rails **15** and **16** on the inside faces thereof that are respectively disposed toward the switch points **17** and **18**.

Each manifold comprises an elongated conduit that is adapted to be mounted on the web W, FIGS. 2 and 3, of a rail as **15** beneath the head **21** thereof. These conduits as **19** are preferably elliptical so that at least those portions of each conduit opposite the switch point **17** are desirably formed to be of reduced size in a horizontal plane. In any event, however, the size of each manifold conduit as **19** is so constructed as to insure that the same will be confined completely beneath the portion of the head **21** of the rail that extends inwardly of the web W, for so to do insures that the manifolds will not project beyond the head of the rails and interfere with the engagement of the switch point and stock rail as shown, for example, in FIG. 2.

Air under pressure in the manifold conduits is to be directed into and along the space between the switch point and stock rail in a substantially continuous stream to sweep out snow, debris and the like from between these rails, and for this purpose nozzles N are provided at spaced intervals along each conduit as **19**, these nozzles being arranged within the plane of such conduit and directed such as shown in FIGS. 2 and 3. It has been found to be advantageous to locate the nozzles in related positions along the manifold so that the nozzles are spaced apart about fifteen inches, although it will be understood that resort could be had to such other spacing as will be found to be advantageous in particular installations.

The nozzles N are arranged and directed relative to the conduits **19** and **20** so as to provide a substantially continuous stream of air effective for the purpose mentioned above, and thus each nozzle N comprises a tubular body section **26**, FIG. 3, bent to provide substantially right-angularly related leg portions. The free end of one

of such portions is associated with an opening provided in the wall of the conduit 19, and preferably the tubular section 26 of each nozzle is then united to the manifold by welding, although resort could be had to any other suitable type of interconnection.

One of the features of the present arrangement is an adjustment of the nozzles so that compressed air may be directed along selected paths in the space between the switch point and stock rail. Thus, the peripheral portion of each tubular body section 26 opposite that connected to the manifold is screw-threaded to receive a hexagonal cap as 29. This cap has a screw-threaded opening at one end thereof so that this cap may be threadedly fitted onto the screw threads on the corresponding end of the nozzle as N. As explained in application Serial No. 410,557, filed February 16, 1954 (now United States Patent No. 2,886,266), of which this application is a division, the cap retains an adjustable ball having an outlet boss with an orifice 36, FIG. 3, and by loosening the cap, the ball and its orifice can be adjusted to cause air to emit therefrom in the desired direction. Reference can be made to the aforesaid application for further explanation in this regard.

As will be explained below, air under pressure is supplied to each of the manifolds to be discharged through the orifices 36 of the nozzles N associated therewith. A stream of air discharged from each nozzle as N is advantageously directed toward the upper surface of the adjacent portion of the base flange 38 associated with each rail, and preferably this stream of air impinges thereon approximately fifteen inches away from the orifices as 36 in those instances where the nozzles N are spaced at fifteen inch intervals along the manifold.

Resort is had in the present instance to an arrangement including a control whereby air under pressure will be intermittently supplied to the manifolds to be intermittently discharged through orifices 36. One arrangement to which resort may be advantageously had in this association is shown in FIG. 1 wherein many of the parts shown are not drawn to scale. A pipe 41 leads from a suitable source of air under pressure, and this pipe is equipped with a shut-off valve 42 of conventional design so that air supplied to the blowing apparatus of the present invention may be shut off when and as desired. In some circumstances, it will be advantageous to control operations of the blowing apparatus from a very remote position such as a switch tower or the like, and in such circumstances, a solenoid operated valve may be employed in place of a hand-operated valve as 42 so that by controlling the operation of such a solenoid valve from such a remote point, control of the blowing apparatus may be effected from such point.

It is advantageous to filter air supplied to the blowing apparatus, for this insures against clogging of control valves and the like through which air is to flow, as will be explained, and to this end the supply pipe as 41 desirably leads first to an air filter 43 of conventional design embodying a filter 43S into which the stream of air flowing in the pipe 41 is deflected prior to passage thereof from the filter to the blowing apparatus. If desired, resort may be had to additional air filters, and it will be advantageous so to do in instances where there is a long extent of pipe through which the air must flow prior to passing through various means included in the apparatus.

Where the blowing apparatus is to be used to free a railway switch of snow, it will be operated in many circumstances at relatively low temperatures, and in order to insure that any moisture that might collect in the system will not freeze under such circumstances, and particularly to insure against freezing of moisture adjacent the discharge orifices 36, it is advantageous to introduce an anti-freeze solution in the system. To this end, resort may be had to devices which are conventionally employed to inject lubricants into air lines. In the present instance, such a device is indicated by 44 in FIG. 1, which includes a bottle-shaped reservoir for holding the anti-freeze solution F. A vertical siphon tube 44P in the reservoir opens at its upper end into a chamber 44C associated with a needle valve 44V and drip gland 44G that is adapted to be manually set for any desired rate of flow. An air tube 44T leads from the line 41 through a ball check valve and into the reservoir containing the anti-freeze F, and below the drip gland 44G the pipe 41 is restricted to afford a venturi effect for draining lubricant through the gland into the pipe 41 leading from the device 44. In this manner, air passing from the air filter 43 flows through the injector 44 to have an anti-freeze solution such as alcohol, diethylene glycol or the like introduced thereinto.

The pipe 41 leads to a solenoid valve 81, FIG. 4, as will be presently explained in detail, and a manually operable adjusting valve 46 is provided in the pipe 41 to control flow of air to this solenoid valve 81 if desired.

In order to insure against water collecting in the air supply line, a water trap 47 is advantageously included in the supply 41 desirably at the lowest point in the supply pipe, and in the present instance such a water trap is disposed between the adjusting valve 46 and the solenoid valve 81. Any water standing in the trap 47 can be ejected under the pressure of the system through a standpipe 47P and a pet cock C of the usual kind. For static conditions, a drain plug 47D is afforded.

A pipe 53 leads from valve 81 to a fitting 54 disposed outwardly of the stock rail 15, and conduit means 55, FIG. 2, lead from a fitting 54 to a nipple 56 that is passed through the web W of the rail as 15 to be connected in the present instance to the manifold 19. A pipe 57 leads from the fitting 54 to a connector 58 formed from rubber or other non-conductive material, the purpose of which will be explained presently. A pipe 59 leads from the coupling 58 to a fitting 60 and suitable conduit means as 61, FIG. 1, leads from this fitting to a nipple 62 passed through the web of a rail to be connected in the present instance to the manifold 20.

The conduit means as 55 includes a flixible connection 63 and the conduit means 61 includes a flexible connection 64, FIG. 1. These flexible connections compensate for any movement that may be induced in the rails adjacent to which they are arranged such as may be attendant to the passage of railway equipment along such rails. Furthermore, the interposition of a coupling 58 of non-conductive material assures against an electrical connection being established between the rails 15 and 16 such as might interfere with the signal system customarily associated with rails of railway equipment.

The pipes 53 and 59 are desirably disposed between adjacent ties as T, FIG. 1, supporting rails as 15 and 16, and again to insure against undesirable collection of moisture a water trap as 65, FIG. 1, is provided at the lowest point in the system of which such pipes are a part, as explained hereinabove.

The solenoid valve 81 is illustrated in detail in FIG. 4 wherein there is shown a supply pipe 41B which is similar to the pipe 41 and which preferably has the shut-off valve as 42, the air filter as 43 and also suitable means as 44 associated therewith for introducing an anti-freeze solution into the air supply. Where resort is had to an arrangement of the kind shown in FIG. 4, the valve 81, effective when open to permit a supply of air under pressure to pass to the manifolds as 19 and 20, may be located at a point remote from the source of air under pressure, and in such circumstances it may be advantageous to direct air flowing from a supply pipe as 41B through an air filter as 80 located adjacent to this valve, air flowing from the air filter as 80 through a relatively short pipe 82 to the valve 81 to be discharged therefrom through a pipe as 53B which may be directed to manifolds in the manner described hereinabove with reference to the pipe 53 and manifolds 19 and 20.

The valve 81 is of the solenoid operated type and includes a control mechanism 83 for the solenoid. In the

form of the apparatus shown in FIG. 4, a bracket **84** is secured to the housing of the solenoid control to support an electrically operated timer **85** of a kind to be described in more detail below. For present purposes, the timer **85** is of a conventional electrical design and includes means effective to hold closed an electric circuit for a predetermined time interval and alternatively maintain such circuit open for another predetermined time interval during a cycle of operation to respectively energize and de-energize the solenoid control for the valve **81**. Desirably, the timer is so arranged that the duration of such intervals may be adjusted as desired.

Conductors as **86** lead from the timer **85** to the electromagnetic coil **83M** included in the solenoid control **83**, and during the time that the timer **85** is effective to close this circuit to energize the solenoid **83**, the solenoid plunger or armature **83A** is operated to withdraw the valve plunger **83V** associated therewith from the valve seat **81S**, whereupon air under pressure flows to and through the pipe **53B** to the manifolds with which it is associated. When the timer **85** is effective to interrupt the circuit to the solenoid control **83**, the valve **81V** closes and remains closed for the period determined by the adjustment of the timer **85**. Thus, the arrangement shown in FIG. 4 may be utilized to bring about an intermittent discharge of air from nozzles as N for the purpose described hereinabove.

It will be understood that a timer as **85** need not be directly associated with the solenoid as **83**, since the conductors as **86** may be made of any desired length. This enables a timing device as **85** to be disposed in any remote location found to be advantageous. Moreover, the timer as **85** may be of such nature as to control the operation of a plurality of circuits so that two or more solenoids as **83** for controlling operations of valves as **81** may be controlled by a single timer **85** as will now be described.

In FIG. 5 there is illustrated an arrangement wherein resort may be had to a single timer to control the operation of a plurality of solenoid operated valves of the kind shown in FIG. 4. In this instance, a single timer **100** is used to control the cycling of compressed air to the manifolds as **19** and **20** of three different railroad switches, switch No. 1, switch No. 2 and switch No. 3, each comprising a stock rail **15** and switch point **17**. For switch No. 1 there is afforded a pipe **41B–1** leading from a source of compressed air, and there may be arranged in this pipe a shut-off valve **42–1**, an air filter **43–1** and an injector **44–1** for anti-freeze solution, all as described above in connection with FIG. 1. The pipe **41B–1** enters one side of a solenoid operated valve **81–1** which is identical to the solenoid valve **81** illustrated in FIG. 4 and a pipe **53B–1** leads from the other side of the valve **81–1** to manifolds including nozzles as N associated with the rails **15** and **17** of switch No. 1. For controlling the opening and closing of the valve **81–1**, a solenoid control **83–1** is associated therewith, and this is inserted electrically between the terminals of a pair of wires **91**, which in turn are connected to a micro switch on the timer **100**, as will be described in somewhat more detail below. At the low point in the pipe **53B–1** leading to the manifolds, there is provided a water-trap **65–1** also as described above.

Each of the other two rail switches shown in FIG. 5 is preferably arranged in identical fashion, and for this reason the description set forth above of the various devices associated with switch No. 1 need not be repeated in this regard. It will suffice to point out here that solenoid valves for switch No. 2 and switch No. 3 are also controlled by micro switches on the timer **100**, and thus there are separate pairs of conductor wires **92** and **93** leading from respective switches on the timer **100** to the solenoid controls **83–2** and **83–3**, respectively. These switches on the timer **100** are in the form of normally closed micro switches that are cam controlled, and the operation of which can be adjusted for energizing the solenoid controls in any time relation. In the present instance, such is accomplished by means of a set of cam discs **101, 102** and **103** that are arranged at 120° intervals on the drive shaft **105** of a motor **106**, and consequently the speed at which these cam discs rotate together can be regulated through the variable speed of the motor. Each of the cam discs includes a lobe of predetermined arc (about 115°) and associated with each cam is a micro switch, SW–1, SW–2 and SW–3, adapted to bridge the terminal in each pair of wires **91, 92** and **93** for energizing the respective solenoid controls. Preferably, these switches are suspended from a bracket **106B** attached as by a strap **106S** to the motor **106**. When the contact buttons of the switches as SW–1 are on the lobes of the cams, the contacts are open, and thereby the valves as **81–1** remain closed. As the motor **106** is effective to rotate the drive shaft **105** and the cams thereon, dwell portions of the cams are presented one by one of the switches, permitting closure and bridging of the corresponding contacts and in turn energizing the solenoids, effecting an opening of the valves associated therewith to permit air under pressure to pass from the pipes as **41B–1** to the pipes **53B–1** and from there to the manifolds as **19** and **20** associated with the rail switch. Advantageously, adjustable cam pairs may be resorted to so that the length of dwell may be pre-selected to give the desired pulse. In this manner, different time periods of operation may be selected for the solenoid valves, and the sequence of operation of the micro switches as SW–1 may be regulated. It will be apparent from the foregoing that by arranging the solenoid valves in parallel, a single micro switch and suitable cam control could be resorted to.

Where such a timer as **100** is to be employed in connection with one valve only, a single cam disc will be utilized, and this is the case of the valve **81**, the control **83** and the timer **85**.

Where such an arrangement as diagrammed in FIG. 5 is resorted to, a control panel at a remote control station is preferably utilized which includes a main on-off switch **110** for the timer **100**, this switch being inserted between the wires **112** leading from the source of supply of electric current for the timer and the controls associated therewith.

In order that the presence of pulses in the nozzles N in the manifolds **19** and **20** embodied in the three rail switches shown in FIG. 11 may be sensed and observed, a bank of indicator lamps **121, 122** and **123** is preferably arranged on the same control panel with the on-off switch **110**, and these three indicator lamps are electrically connected by pairs of wires **121A, 122A** and **123A** respectively to return indicators or sensing elements **131, 132** and **133** respectively which can be in the form of switches which close accordingly as the corresponding solenoid valves are opened, and remain closed so long as these valves remain open so that circuit to the indicator lamps **121, 122** and **123** is thereby closed and indicates both the duration and rate of the pulses of compressed air emitting from the manifolds associated with the rail switches.

Hence, while I have illustrated and described preferred embodiments of my invention it is to be understood that these are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In apparatus for maintaining clean the spaces between the engaging rails of a plurality of railway switches and each of which switches includes an elongated manifold having discharge means disposed beneath the head of one of said rails thereof to direct intermittent pulses of air under pressure into said spaces for sweeping out snow, debris and the like, means affording a source of air under pressure common to said manifolds, means for

establishing such pulses having both a definite duration and rate individually for each railway switch and comprising, individual pipes connected to said source and respectively connected to said manifolds for directing said air under pressure to each of said manifolds, a solenoid valve in each of said pipes adapted when open to permit air under pressure in the related one of said pipes to flow to the related one of said manifolds, an electrical control circuit associated with the solenoid coil of each of said valves and adapted when energized to hold such valve open, and when de-energized to permit the valve to close, so that air under pressure is fed in pulses independently to said manifolds, a timer operatively connected to the control circuit of each of said valves for regulating both the time interval during which the control remains energized and the time interval during which the control remains de-energized so that pulses of air under pressure having a corresponding duration and rate are emitted from said manifolds, said timer including an electrical timing switch for the circuit of each valve, a separate timing cam for operating each timing switch, and said cams being secured for individual adjustment on a common shaft driven from a variable speed motor.

2. Apparatus according to claim 1 wherein there is a sensing switch associated with each solenoid valve for sensing the operation thereof and wherein said sensing switches are connected to indicator lamps.

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