Oct. 2, 1945. L. A. SAFFORD 2,386,006

SANDER

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Fig. 1

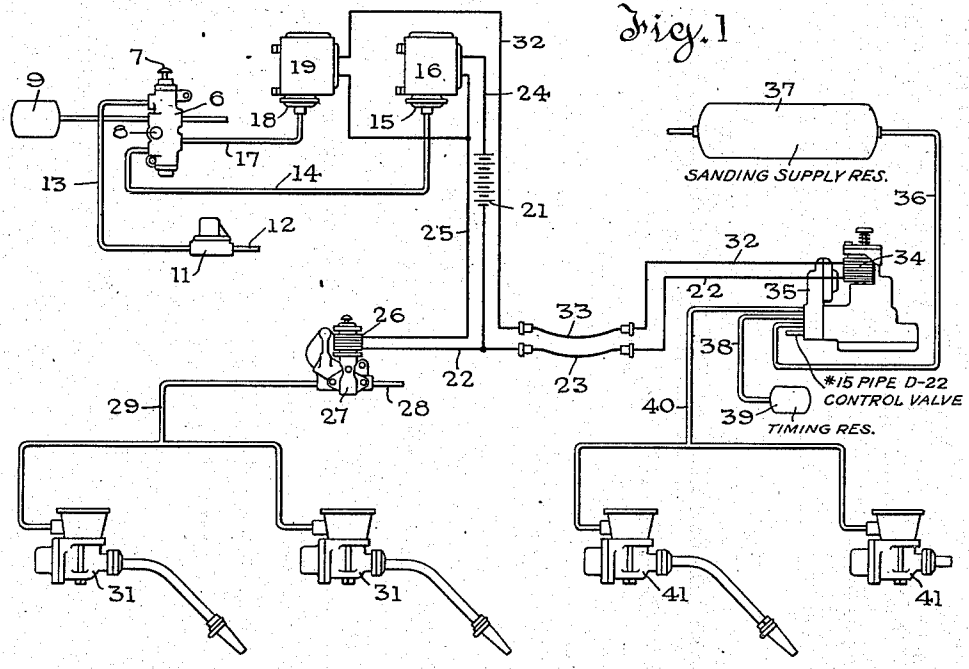
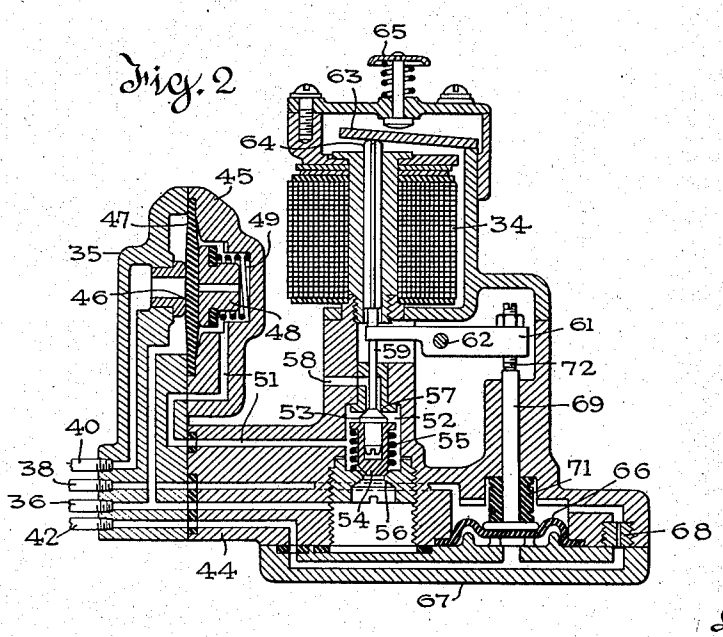


Fig. 2



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2,386,006

SANDER

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4 Claims. (Cl. 291—3)

This invention relates to sanding devices intended for application to all the wheels of two or more cars connected in a train and capable of being put into action either pneumatically or electrically.

In the patent to Campbell 2,243,244 issued to applicant's assignee May 27, 1941 there is described a sanding system in which sanding is controlled by electric circuits from the head end of the train. The control includes means which may be put into action manually by the engineer or may be put into action automatically by the occurence of a brake application. That system also included a secondary means to initiate timed sanding on each car as an incident to the occurrence of a brake application on that car.

The purpose in applying this secondary control is to ensure sanding on the car at the commencement of a brake application. This is not needed where the brake application is initiated at the head of the train but is needed when the brake application is initiated at or near the rear end of the train through the operation of a conductor's valve or as the result of a ruptured brake pipe, to name the two more important instances.

This timed sanding initiated on the car itself is intended to bridge the time interval between the start of an emergency application toward the rear of the train and the response of the main sanding control at the head of the train. When the sanding valve at the head of the train functions it assumes control because the timing characteristic of the local control terminates the local control shortly after the head end control takes over.

The Campbell system of Patent 2,243,244 has demonstrated such marked utility that there is a demand for a system using simpler sand traps and a simpler local control than is afforded by the illustrated Campbell embodiment. The present invention will supply that demand.

In the accompanying drawing is illustrated a system of the type mentioned, including the simplified sanding control for the car. Although the drawing shows the sanding equipment for a locomotive and one trailer car, it will be understood by those skilled in the art that the car equipments can be repeated for successive cars in a train of any length. In fact the secondary control assumes importance particularly in trains of considerable length.

In the drawing:

Figure 1 is a diagram showing the sanding system for a locomotive and one car.

Figure 2 is a diagrammatic section of the control mechanism for a car sander.

The sanding control mechanism illustrated in Figure 1 as applied to the locomotive embodies the invention of another Campbell Patent 2,222,604 issued to applicant's assignee November 26, 1940. The function of this control is to sand the wheels on the locomotive and on all the cars of the train, if timed sanding is effected either manually or automatically. However, if the sanding-at-will control is operated, only the sanders on the locomotive function. This permits sanding-at-will to be used for traction sanding in starting when it is needless and undesirable to sand ahead of car wheels. The controlling mechanism is shown in detail in the Campbell patent but need be identified only generally here.

In Figure 1 the body of the engineer's sanding valve is indicated at 6. Mounted on this is a button 7 which may be manually operated to initiate timed sanding. There is also a button 8 which may be manually depressed to cause sanding-at-will and this causes sanding to continue only as long as the button is held depressed. The reservoir 9 is a timing volume which determines the duration of timed sanding, and the device 11 is the impulse valve which serves as means for automatically initiating timed sanding. The pipe 12 leads from a port in the control valve (not shown) which forms part of the air brake system on the locomotive. The control valve is so contrived that this port is put under pneumatic pressure when the control valve functions to cause an emergency brake application.

In the well known D 22 control valve the pipe designated by 12 in the present drawing is called the "number fifteen pipe." When the pipe 12 is put under pressure, the impulse valve functions to cause pressure impulse in the pipe 13 which leads to the valve actuating motor in housing 6.

The valve 6 conforms to the showing in Patent 2,222,604. An impulse valve of the type mentioned is illustrated at 155 in Patent 2,243,244.

The pipe 14 leads from the valve 6 to the motor portion 15 of a normally open sanding switch 16. During any sanding effected by operation of the valve 6, the pipe 14 is under pressure, and the switch 16 is closed by the motor 15.

The pipe 17 leads to the motor 18 of the normally closed interlock switch 19. During timed sanding the pipe 17 is vented, and the switch 19 remains closed, but during sanding-at-will the pipe 17 is under pressure and the switch 19 is opened by its motor 18 to prevent operation of the sanders on the cars.

No novelty is here claimed for the apparatus so far described, for it is a standard controlling arrangement with applicant's assignee.

The source of electric current to operate the sanding circuits is represented by a battery 21 charged in any suitable way. One terminal is connected to a common return line 22 which extends throughout the locomotive and the train of cars, connectors 23 being used between cars.

The other terminal of the battery 21 is connected by line 24 with one contact of the normally open switch 16. The other contact of switch 16 is connected by a branch line 25, first with one contact of the normally closed interlocking switch 19, and second with one terminal of the winding 26 of normally closed magnet valve 27, the other terminal of which is connected to the common return line 22.

The normally closed valve 27 receives air from any source, such as main reservoir via pipe 28 and is connected through the branched pipe 29 with the air supply ports of the locomotive sand traps, two of which are indicated at 31.

The traps 31 may be of any suitable construction, and it is immaterial to the invention whether or not they contain an impulse timing valve for clean out purposes. Preferably they do include this component for which no novelty is here claimed.

The other terminal of the normally closed interlock switch 19 is connected directly to line 32 which extends throughout the cars of the train. The line 32 is connected from car to car by connectors 33 similar to the connector 23 already mentioned.

Connected between the common return line 22 and the line 32 are the windings 34 of the sanding control magnet valves, one of which is located on each car of the train and only one of which is illustrated in Figure 1. The construction of this valve is shown in detail in Figure 2, to which reference should now be made.

The car sanding valves are each mounted on a corresponding pipe bracket 35 to which all pipe connections are made. These are the sanding air supply connection 36 which leads from the sanding supply reservoir 37 charged by any suitable means (not illustrated), pipe 38 which leads to a timing reservoir 39, pipe 40 which leads to two sand traps 41 which may be similar to the traps 31 already described, and pipe 42 which is the number fifteen pipe of the control valve on the car.

The purpose in illustrating two sanders on the locomotive and two sanders on the car is merely to indicate that a plurality of sanders are controlled in unison. As a rule there would be a larger number than two both on the locomotive and on each car.

Bolted to the pipe bracket 35 is the body 44 of the local sanding control valve and the body 45 of a relay valve which controls the main flow of air to the sanders. In the parts 35, 44 and 45 there are a number of passages some of which are continuations of the pipes 36, 38, 40 and 42. For simplicity such passages are identified by the reference numerals applied to the pipe since they are simply continuations thereof.

The pipe 40 communicates with the valve seat 46 pressed into the bracket 35 and controlled by a combined diaphragm and valve 47 whose periphery is clamped in a seat formed in the mating surfaces of the bracket 35 and cap 45. A bearer member 48 transmits to the center of the diaphragm the closing thrust of a coil compression spring 49. The space around the seat 46 is in communication with the supply passage 36, and thus the valve 47 controls flow from this supply passage to the car sander connecting pipe 40 and is normally closed.

The space to the right of the valve and diaphragm 47 is connected by a passage 51 with the valve chamber 52 formed in the body 44. Within the valve chamber are mounted opposed poppet valves, an exhaust valve 53 which is normally closed, and a supply valve 54 which is normally open. The valves simply telescope together and are biased by a coil compression spring 55 in an upward direction so that the spring holds the valve 54 off its seat 56 and holds the valve 53 against its seat 57. The passage through the seat 57 leads to atmosphere at 58.

The chamber below the seat 56 is in communication with the supply connection 36. The valve 53 has a pilot or stem 59, and when this stem is forced downward, the supply of pressure fluid to the space to the right of diaphragm 47 is cut off and that space is vented to atmosphere. The effect is to permit flow from the supply connection 36 to the sander connection 40.

Two means are afforded to depress the stem 59 and consequently this stem is caused to react against the left end of a lever 61 which is fulcrumed at 62 in the housing 44. One means to operate the lever 61 is an armature 63 of the electro magnet 34. This armature engages the stem 64 when the winding 34 is energized, and by forcing the stem downwardly against the left end of lever 61, depresses stem 59 already described. The armature 63 may be manually depressed by a spring retracted button 65.

The second means for operating the valves through the lever 61 is an impulse motor. This comprises a diaphragm 66 clamped at its periphery between the housing 44 and a cap 67. The cap and housing are formed to provide chambers above and below the diaphragm. These chambers are in communication through a flow restricting choke 68, and the chamber below the diaphragm is in communication with the number fifteen pipe connection 42. The space above the diaphragm 66 is in communication with connection 38 which leads to the timing reservoir 39. Thus the timing reservoir serves to enlarge the effective volume above the diaphragm 66. The diaphragm 66 reacts upwardly against the stem 69 which passes through a tubular elastic sealing member 71 which performs the double function of biasing the stem 69 downward and of inhibiting leakage around the stem. The upper end of the stem 69 engages an adjustable thrust member 72 threaded in the right hand end of lever 61 and locked in adjusted positions by a check nut as shown.

Operation

If the engineer depresses the sanding-at-will button 8, the effect is to close switch 16 and open switch 19 with the result that only the winding 26 is energized. In consequence air is supplied to the locomotive sanders 31.

If the engineer depresses the timed sanding button 7, or if an emergency application initiated at the head of the train operates impulse valve 11, the switch 16 will be closed and the interlock switch 19 will remain closed. In consequence the winding 26 and the windings 34 on cars throughout the train will be energized.

The locomotive sanders are operated as already described, and the car sanders are op-

erated as follows. Energization of winding 34 shifts the valves 53, 54 and vents the space to the right of the valve diaphragm 47; supply pressure forces the valve diaphragm to the right; and air flows from the supply reservoir 37 to the sanders 41.

This action will precede the functioning of the diaphragm 66 where the application is initiated at the head of the train, but suppose the application is initiated at the rear of the train by any means. The control valve on the nearest car will move to emergency and put its number fifteen pipe under pressure. This subjects the lower side of diaphragm 66 to pressure before any equalizing pressure can develop above the diaphragm. The diaphragm 66 moves up, and the stem 69 rocks lever 61 counter-clockwise, shifting the valves 53, 54 and causing the operation of the sanders on that car.

This action will occur on each car so rapidly that sanding starts before the emergency application takes hold on the car and thus will bridge any time lag in the energization of the winding 34 on that car. However, the pneumatic actuation does not persist long.

Flow through the choke 68 gradually charges the timing reservoir 39 with the result that after an appropriate time interval the pressures on diaphragm 66 approach equalization, and the stem 69 is restored by the elastic member 71.

It may be remarked that the diaphragm 66 functions in every emergency application, but in case where sanding is initiated automatically at the head of the train, the winding 34 will be en-energized and will have started sanding before the diaphragm 66 becomes effective to cause sanding.

The mechanism above described operates according to the basic principles disclosed in the Campbell patents but greatly extends the commercial utility of the Campbell concept by providing an extremely simple and comparatively inexpensive structure. There are only two poppet valves and one diaphragm valve in the control device of Figure 2. This leads to low initial cost and low maintenance cost because devices of this type operate with a remarkable precision and lend themselves to economical manufacture.

While one embodiment of the invention has been described in great detail in compliance with the patent statutes, the embodiment is intended to be illustrative, and no necessary limitation to the exact structure is implied.

What is claimed is:

1. The combination of a sand trap; valve means biased to a closed position and controlling the supply of compressed air to said trap; and two means each arranged to open said valve means independently of the other, one thereof comprising an electromotive winding suited for inclusion in a train circuit and the other comprising a pneumatic impulse motor having timing means to terminate its action, said motor being suited for energization by an air brake control valve.

2. The combination of a sand trap; a fluid pressure actuated valve controlling the supply of compressed air to the sand trap; a pilot valve arranged to control said pressure actuated valve and biased to a position in which it maintains the pressure actuated valve closed; and two means each operable independently of the other and each capable of directly actuating said pilot valve in opposition to said bias, one thereof comprising an electro-motive winding suited for inclusion in a train circuit, and the other comprising a pneumatic impulse motor having timing means to terminate its action and suited for energization by a brake control valve.

3. The combination of a sand trap; a fluid pressure actuated valve controlling the supply of compressed air to the sand trap; a pilot valve of the admission and exhaust type controlling the pressure which actuates the supply valve; means biasing the pilot valve to a position in which it causes the supply valve to close; and two independently operable means for shifting the pilot valve against said bias, one thereof comprising an electro-motive winding suited for inclusion in a train circuit, and the other comprising a pneumatic impulse motor having timing means to terminate its action and suited for energization by a brake control valve.

4. The combination of a sand trap; a fluid pressure actuated valve controlling the supply of compressed air to the sand trap; a pilot valve of the admission and exhaust type controlling the pressure which actuates the supply valve; means biasing the pilot valve to a position in which it causes the supply valve to close; and two motor means each operable independently of the other to react in thrust upon said pilot valve to shift the valve against said bias, one thereof comprising an electromotive winding suited for inclusion in a train circuit with a shiftable armature for delivering said thrust reaction, the other comprising a pneumatic impulse motor having timing means to terminate its action and including a pressure operated movable abutment and connections for delivering the thrust of said abutment to said pilot valve.

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