A. J. HALL.

RAIL SANDER.

APPLICATION FILED DEC. 8, 1915.

1,303,300.

Patented May 13, 1919.

2 SHEETS—SHEET 1.

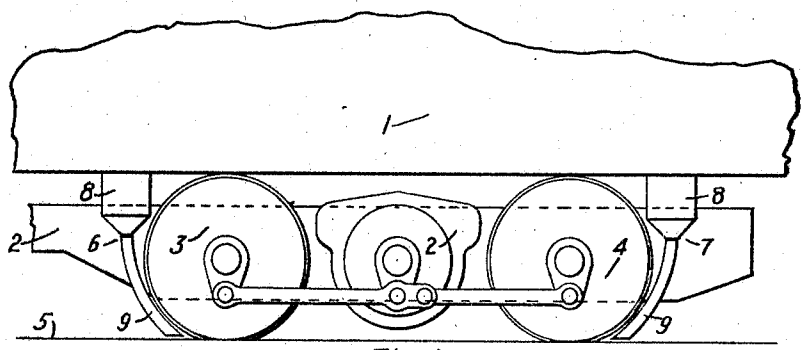


Fig. 1.

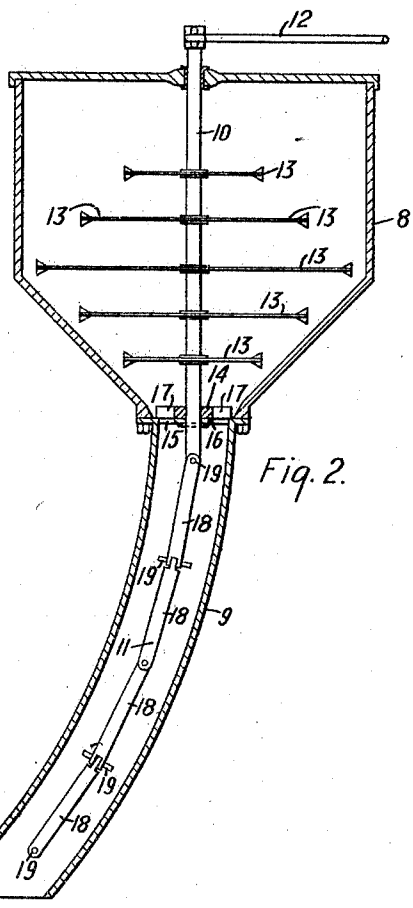


Fig. 2.

WITNESSES:

Fred. A. Lind.

W. C. McCoy.

INVENTOR

Arthur J. Hall

BY

Wesley G. Carr

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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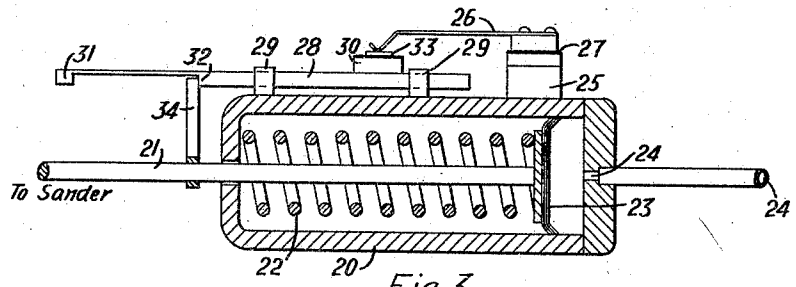


Fig. 3.

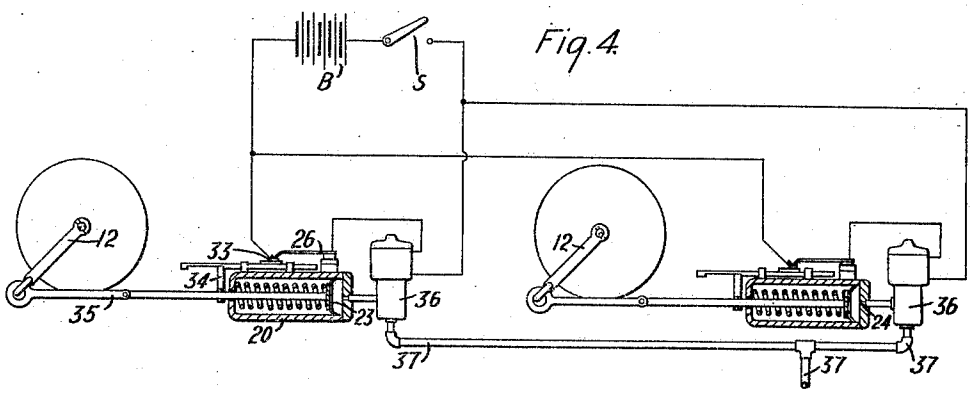


Fig. 4.

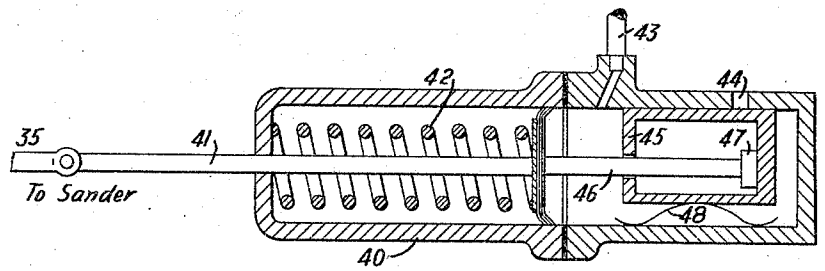


Fig. 5.

WITNESSES:

Fred. A. Lind.

W. C. McCoy.

INVENTOR

Arthur J. Hall

BY

Wesley Gloar

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR J. HALL, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

RAIL-SANDER.

1,303,300. Specification of Letters Patent. Patented May 13, 1919.

Application filed December 8, 1915. Serial No. 65,705.

To all whom it may concern:

Be it known that I, ARTHUR J. HALL, a subject of the King of Great Britain, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rail-Sanders, of which the following is a specification.

My invention relates to rail-sanding systems and particularly to such sanders and sanding systems as are commonly employed with locomotives and the like for conveying sand to the rails immediately in advance of the driving wheels.

One of the objects of my invention is to provide a system of the above-indicated class in which moderately wet sand may be used.

Another object of my invention is to effect economies in the consumption of compressed air or other operated fluid and in the consumption of sand.

A third object of my invention is to provide an efficiently-operated rail-sanding system of the gravity-fed type.

A further object of my invention is to provide a system of the above specified character wherein the sand reservoirs and delivery tubes may be more conveniently located than in such systems as are now commonly employed.

It has heretofore been proposed to provide a sand-delivery tube with a jointed agitating rod which was given a reciprocating motion. It has also been proposed to prevent the clogging of the delivery tubes by forcing a fluid through them. Experience has shown that the former method of effecting the delivery of sand to the rails is expensive to operate by reason of the large quantity of fluid required for the actuation thereof and is expensive to install. The latter system requires a large quantity of fluid for its operation and is wasteful in the use of sand because the sand is scattered by the operating fluid as it emerges from the delivery pipe. This same action causes the fine sand to be blown into the bearings and other movably related parts of the locomotive and thus hastens the wearing away thereof. The sand used in such a system must be clean and dry.

My invention provides a gravity-fed sanding system which avoids the disadvantages of the above recited systems and has other advantages that are herein set forth.

Figure 1 of the accompanying drawings is a side elevational view of a portion of a locomotive embodying a sanding system such as I propose; Fig. 2 is a side view, partially in section and partially in elevation, of a sand reservoir and its associated delivery tube; Fig. 3 is a side view, partially in section and partially in elevation, of a reciprocating engine for use with a sanding device embodying my invention; Fig. 4 is a diagrammatic view of a sanding system and includes a side view, partially in section and partially in elevation, of mechanisms for operating the sanders; and Fig. 5 is a side view, partially in section and partially in elevation, of an operating mechanism that may be incorporated in the system shown in Fig. 4.

Referring particularly to Fig. 1 of the drawing, the locomotive body 1 is provided with a truck 2 and a plurality of driving wheels 3 and 4 which operate on a rail 5. The truck 2 is provided with a plurality of rail sanders 6 and 7 that are adapted to feed sand to the rail 5.

Fig. 2 of the drawing shows a side view, partially in section, of a sanding device such as is shown in combination with the locomotive truck 2 and it comprises a sand reservoir 8, a delivery tube 9 that is adapted to carry sand from the reservoir 8 to the rail 5, and agitating means 10 and 11. A section 10 of the agitating means is rotatably mounted within the reservoir 8 and is operatively connected to a jointed rod 11 that extends through the delivery pipe 9. A laterally extending arm 12 is removably connected to the rod member 10 and is arranged to give a rotative movement thereto. The section 10 of the rod member is provided with a plurality of laterally extending arms 13 which are adapted to be given a rotative movement by the rod 10. The section 10 is also provided with a segmental valve section 14 that is of a well-known form wherein the section 14 is adapted to normally close the openings 15 through the section 16. The valve section 14 is provided with a plurality of openings 17 that register with the openings 15 when the member 14 is rotated through a given angle. The member 16 also serves to support the agi-

tating device 10. The rod member 11 comprises a plurality of pivotally joined sections 18, the alternate joints of which are arranged at right angles to one another so that the rod member 11 may be freely flexed in any direction and will readily accommodate itself to curves in the delivery pipe 9. The rod sections 18 are connected by transverse pins 19, the ends of which form laterally projecting arms.

It will readily be seen that the movement of the arm 12 through an angle from its initial position imparts a rotative movement to the arms 13 and 19 and alternately opens and closes the rotary valve 14. Thus, the sand from the reservoir 8 is broken up by the arms 13 and is caused to flow freely from the reservoir through the valve 14 and the delivery pipe 9 to the rail 5.

A suitable means for imparting motion to the arm 12, that is shown in Fig. 3, comprises a cylinder 20, a piston member 21 that is slidably mounted therein, and a spring 22 that tends to move the piston member 21 to one end of the cylinder 20. A cylinder head 23 is provided with a port 24 that is connected to a suitable fluid valve (not shown in this figure). The cylinder 20 is also provided with a lug portion 25 to which is secured a contact finger 26. The insulating strip 27 serves to electrically insulate the contact finger 26 from the lug portion 25. A member 28 is slidably mounted upon the cylinder 20 by means of bearings 29 and is provided with a lug portion 30 and arm-engaging members 31 and 32. The contact finger 26 is adapted to coöperate with the contact terminal member 33 which is mounted upon, and electrically insulated from, the lug portion 30. The piston member 21 is provided with an arm 34 that is adapted to engage the projections 31 and 32, respectively, of the slidably-mounted member 28 when the same is moved in a backward or forward direction.

In Fig. 4, the above described device is shown operatively connected to the arm 12 of the sanding device illustrated in Fig. 2 by means of the interposed rod member 35. A suitable source of electrical energy or battery B is adapted to actuate an electromagnet fluid valve 36 when a circuit is established through the switch S, the energizing coil of the magnet valve 36 and the contact terminal members 26 and 33. The electromagnet fluid valve 36 is of a well-known type that is adapted to establish a connection from the fluid-pressure supply pipe 37 to the port 24 when the magnetizing coil of the magnet fluid valve is energized and to establish a connection from the port 24 to the atmosphere when the magnetizing coil thereof is deënergized.

When it is desired to supply sand to the rails 5, the switch S is closed and a circuit is thereby established from the positive terminal of the battery B through the switch S, the energizing coil of the magnet valve 36, the contact finger 26 and the terminal member 33 to the negative terminal of the battery B. The coil of the magnet valve 36 is thus energized, and fluid under pressure is admitted into the cylinder 20 through the port 24. The admission of fluid to the cylinder 20 causes pressure to be applied against the piston head 23 and thereby causes the piston 21 to be forced away from the cylinder head 23. The outward movement of the piston 21 compresses the spring 22 and causes the arm 12 of the sanding device to be rotated through a small angle. This movement of the arm 12 opens the sand valve 14 and causes sand to flow from the reservoir 8 through the delivery pipe 9 to the rail 5, as hereinbefore set forth. The outward movement of the piston 21 causes the arm 34, which is associated therewith, to engage the projection 31 of the slidably mounted member 28 and to move the same a short distance with the piston 21. The movement of the member 28 causes the contact terminal 33 to become disengaged from the contact finger 26 and thus interrupt the energizing circuit for the magnet valve 36. Deënergizing the valve magnet 35 establishes a connection from the port 24 to the atmosphere and thereby releases the fluid pressure from the piston 21, and the action of the spring 22 returns the piston 24 to its initial position. As the piston returns to the initial position, the arm 34 engages the stop 32 and thereby causes the member 28 to move to a corresponding position. The terminal member 33 again engages the contact finger 26 and establishes an energizing circuit for the magnet of the valve 36 and thus causes the above recited cycle to be repeated.

It will be seen that the closure of the switch S causes the arm 12 of the sanding device to be moved backwardly and forwardly at rapidly and regularly recurrent intervals and thus insures an uninterrupted flow of sand to the rails 5.

It will also be seen that the amplitude of the oscillation of the piston 21 may be readily changed by altering the distance between the arm-engaging members 31 and 32.

Where a source of electrical energy is not available or is inconveniently located, I propose a device similar to that shown in Fig. 5 for operating the sander. This device comprises a cylinder 40, a piston 41 and a spring 42 which are similar to those described in connection with the mechanism shown in Fig. 3. The cylinder 40 is provided with an inlet port 43 and an exhaust port 44 that are adapted to be alternately closed by the slidably mounted valve member 45. The extension 46 of the piston 41 is slidably asso-

ciated with the valve member 45 and is provided with a head member 47. A spring 48 is associated with the valve member 45 and biases the same in an upward direction.

When fluid under pressure is admitted to the cylinder 40 through the port 43, the piston 41 is moved outwardly until the head 47 engages the side of the valve 45 and causes the valve to close the inlet port 43 and to open the exhaust port 44. When the fluid pressure is released, the spring 42 forces the piston 41 to return to the off position. This causes the head member 47 to engage the valve member 45 and thus close the exhaust port 44 and open the supply port 43. The above cycle is repeated so long as fluid under pressure is admitted to the cylinder 40.

These devices, as shown, are intended only to be illustrative of suitable means for accomplishing particular purposes, and it is evident that any other suitable means may be employed.

I do not wish to be restricted to the specific structural details herein set forth since various modifications thereof may be effected without departing from the spirit and scope of my invention, and I desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a rail sander, the combination with a sand-delivery pipe, of flexible agitating means extending through said delivery pipe only and rotatably mounted therein.

2. In a rail sander, the combination with a sand reservoir having a sand-delivery pipe, of an agitating means comprising a plurality of pivotally joined rod sections rotatably mounted within said reservoir and delivery pipe.

3. In a rail-sanding system, the combination with a sand reservoir having a delivery tube, of agitating means rotatably mounted within said reservoir and delivery tube, and a valve actuated by said agitating means.

4. In a rail-sanding system, the combination with a sand reservoir having a delivery pipe, of an agitating device rotatably mounted therein, and a fluid-pressure actuated means for imparting rotative movement to said agitating device.

5. In a rail-sanding system, the combination with a sand reservoir having a delivery pipe, of an agitating device rotatably mounted therein, and a fluid-pressure actuated and electrically-controlled means for imparting a rotative movement to said agitating device.

6. In a rail sander, the combination with a sand reservoir having a delivery tube, of an agitating means rotatably mounted therein, and a normally closed sand valve associated with said agitating means and adapted to be opened when said agitating means is rotated through a predetermined angle.

7. In a rail-sanding system, the combination with a sand reservoir having a delivery tube, of an agitating device rotatably mounted therein and comprising a plurality of pivotally joined rod sections, a normally closed sand valve associated with said agitating device and adapted to be opened when said agitating device is rotated through a predetermined angle, and means for actuating said agitating device comprising a piston, a spring for biasing said piston to a predetermined position, a source of fluid pressure, and a magnet valve that is automatically and successively energized and deënergized by the movement of said piston to respectively admit fluid pressure to act upon said piston and to release the fluid pressure therefrom.

8. In a rail-sanding system, the combination with a sand reservoir having a delivery tube, of an agitating device rotatably mounted therein and comprising a plurality of pivotally joined rod sections, a normally closed sand valve associated with said agitating device and adapted to be opened when said agitating device is rotated through a predetermined angle, and means for actuating said agitating device comprising a cylinder that is provided with an inlet port and an exhaust port, a piston, a spring for biasing said piston toward one end of said cylinder, a source of fluid pressure, and a valve slidably mounted within said cylinder and associated with said piston and dependent upon the movement of said piston for automatically and successively opening and closing said exhaust port and closing and opening said inlet port.

9. In a rail sander, the combination with a sand reservoir having a curved sand-delivery pipe, of sand-agitating means comprising a plurality of joined rod sections rotatably mounted within said reservoir and extending into said curved delivery pipe.

10. The combination with a rail sander having a reservoir and a sand-delivery pipe, of flexible sand-agitating means extending through said reservoir and delivery pipe, and means for imparting a rotative movement to said agitating means.

In testimony whereof, I have hereunto subscribed my name this 30th day of Nov. 1915.

ARTHUR J. HALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."