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BELL RINGING APPARATUS

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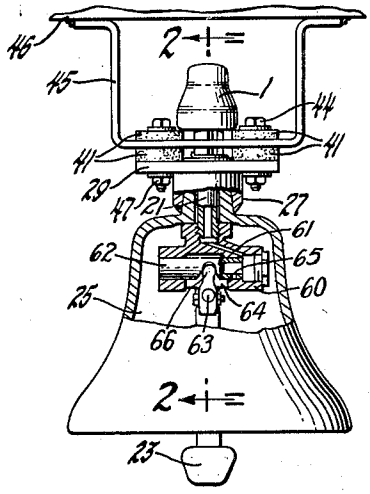


Fig. 1

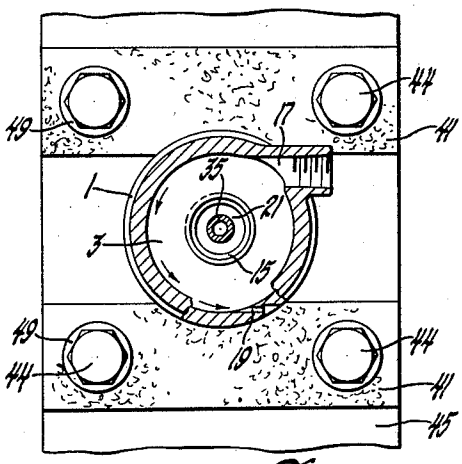


Fig. 3

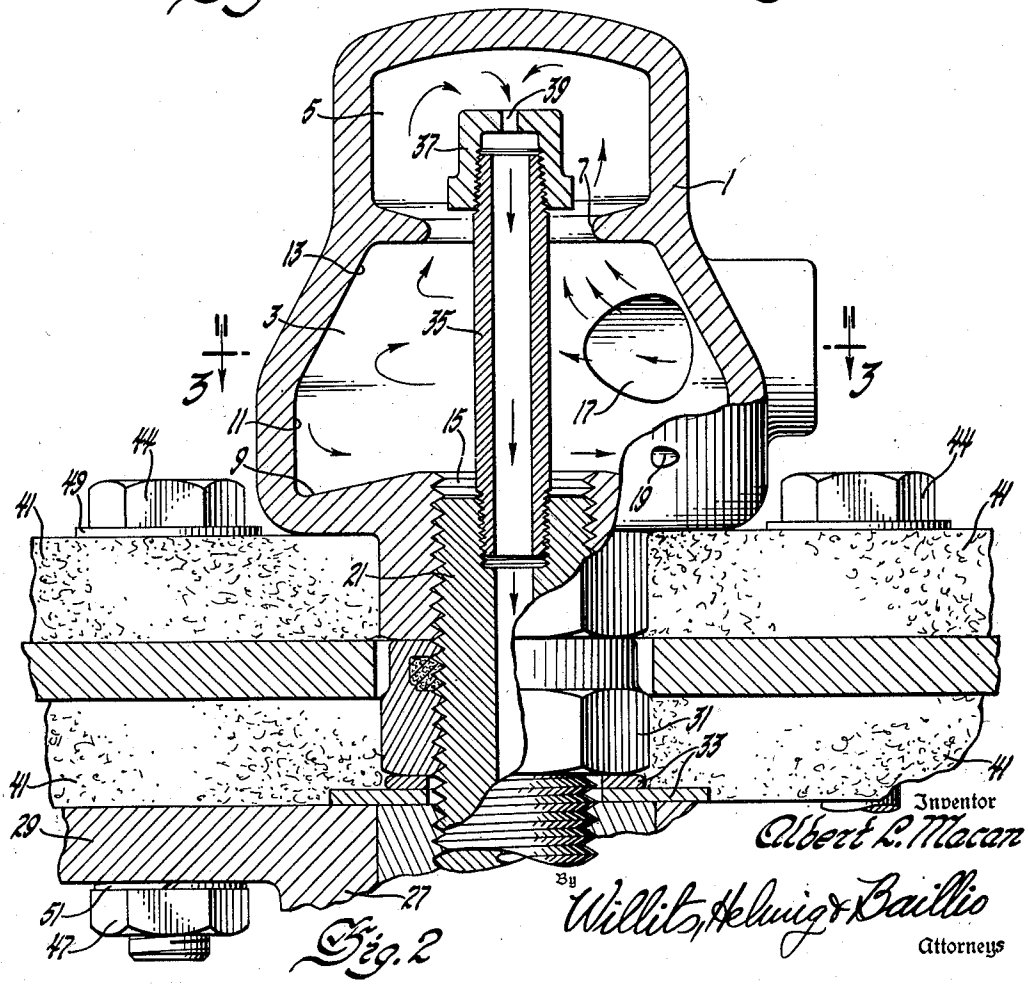


Fig. 2

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BELL RINGING APPARATUS

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This invention relates to locomotive bell ringing mechanisms of the pneumatic type.

The principal object of the invention is to provide a pneumatic bell ringing mechanism and simple and compact air cleaning means connected therewith for separating and for discharging any moisture and dust from the air supplied the bell ringing mechanism and cushion mounting means for resiliently supporting the bell, bell ringing mechanism, and air cleaning means on a locomotive underframe to insure uninterrupted operation in freezing weather and dirty conditions present in this location and to also prevent transmission of vibrations between the bell, bell ringing mechanism and locomotive underframe.

The combined means by which this object is accomplished will become apparent by reference to the following detailed description and drawings illustrating one modification of the invention which enables a bell mechanism to be mounted on a locomotive underframe.

Figure 1 of the drawings is a vertical side elevation view of the bell mechanism and the mounting details thereof.

Figure 2 is an enlarged fragmentary cross-sectional elevational view taken in the plane of line 2—2 of Figure 1, showing the details of the centrifugal air cleaning and water separating structure.

Figure 3 is a reduced, transverse sectional view taken on line 3—3 of Figure 2 with parts shown broken away and in section.

As best seen in Figures 1 and 2 the bell mechanism includes an air cleaning device comprising a hollow body 1 having axially aligned chambers 3 and 5 of circular cross-section in the ends of the body and a reduced diameter neck portion 7 intermediate the chambers 3 and 5 and in axial alignment therewith. The axis of the body 1 is shown disposed vertically and the chamber 3 becomes the lower chamber 3 and serves as a separating chamber and the chamber 5 becomes the upper chamber and serves as a clean air chamber.

The separating chamber 3 is provided with a bottom wall 9 tapering radially inwardly and upwardly from a lower cylindrical side wall 11 and the upper chamber side wall 13 tapers radially inwardly and upwardly from the lower wall 11 toward the neck portion 7. A threaded opening 15 is provided in the upstanding central portion of the bottom wall 9 of the separating chamber 3. A horizontal air inlet port 17 is disposed tangentially in the upper tapered side wall 13 of the separating chamber 3 and a small diameter horizontal discharge port 19 is disposed in opposite tangential direction to the air inlet port 17 in the opposite side of the lower cylindrical side wall 11 of the separating chamber 3 adjacent the depressed peripheral portion of the bottom wall 9, as best seen in Figures 2 and 3. The outer end of the air inlet port 17 is internally threaded for connection to a pipe connection leading to a source of air under pressure.

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The threaded opening 15 in the bottom wall 9 of the separating chamber 3 is screwed on the externally threaded upper end of the nipple 21 leading to a pneumatic bell ringing mechanism, of a well known type. This pneumatic bell ringing mechanism may, as shown in Figure 1, include a suitable cylinder 60 located in the upper interior of the bell 25 by threaded securement to the lower end of the nipple 21. One end of the cylinder is closed and is in communication with the interior of the nipple by an air inlet passageway 61. A piston 62 is slidably reciprocable in the cylinder and controls the opening and closing of an elongated exhaust port 64 located in the side wall of the cylinder at a distance from the passageway 61, air pressure in the cylinder being relieved by this port when in registry with an opening 65 in the piston. The clapper 23 of the bell which is hinged at 63 has an arm 66 extending through the exhaust port 64 and interengaging the side of the piston. This specific bell ringing structure per se is old and well known in the art, as shown by the U. S. Patent 1,808,313 to Miller, and forms no part of my invention. The nipple 21, as best seen in Figure 2, projects upwardly through a central opening in the top of the bell 25 and through a hollow bell spacer block 27, provided with an upper mounting flange 29, and a nut 31 and washers 33 are placed on the upper end of the nipple 21, below the body 1 of the air cleaner in order to clamp the bell 25 to the spacer block 27. A tubular clean air outlet 35 of the air cleaner is threaded in the internally threaded upper end of the nipple 21 of the bell ringing mechanism and the upper end of this tubular air outlet 35 extends through the neck 7 of the body 1 and into the upper clean air chamber 5. A pipe cap 37, having an axial air inlet orifice 39 of substantially the same diameter as the air discharge port 19, is screwed on the upper end of the tubular air outlet 35, shown positioned in the upper clean air chamber 5 in Figure 2.

The mounting flange 29 of the bell spacer block 27 is resiliently supported by means of rubber cushions 41 placed on opposite faces of the lower portion of a U shaped bell mounting bracket

45, the upper portions of which are secured to the underframe 46 of a locomotive. Bolts 44 extend through suitable aligned openings in the flange 29 and bracket 45 and through the cushions 41 with nuts 47 and suitable washers 49 and 51 shown on these bolts for retaining the cushions 41 in compression. The bell, bell ringing mechanism and the body 1 of the air cleaner mounted thereon are accordingly resiliently mounted by the rubber cushions 41 on the bell mounting bracket 45 to cushion vibration of the bell and bell ringing mechanism and air cleaner and thereby effectively reduce the transmission of sound vibrations from the bell to the locomotive underframe.

The operation of the separating device is as follows:

Air under pressure enters the tangential air inlet port 17 in the upper tapered side wall 13 of the separating chamber 3 and is whirled at high velocity therein to cause separation of moisture and dirt therefrom by centrifugal force. The angular velocity of the whirling air increases in inverse ratio of the square of the distance of the center of rotation and hence the angular velocity at the upper, smaller diameter end of the tapered wall 13 is much greater than at the lower, larger diameter end and the maximum velocity of whirl and centrifugal separating force on the particles of moisture and dirt occurs in the reduced diameter neck 7. The separated moisture and dirt particles fall to the depressed peripheral portion of the bottom wall 9 and are discharged through the reduced diameter, discharge port 19 which, as mentioned, disposed in opposite tangential direction to the air inlet port 17 and faces into the whirling stream of separated particles. The clean air is whirled at maximum velocity and passes upwardly through the neck 7 into the upper clean air chamber 5 from which it can escape only in a downward direction through the reduced diameter orifice 39 in the pipe cap 37 on the upper end of the tubular clean air outlet pipe 35 and passes downwardly therethrough and thence through nipple 21 and the passageway 61 to the closed end of the cylinder 60 of the bell ringing mechanism. Because of the restrictive effect of the orifice 39 on the rate of air flow into the cylinder 60 and the inertia of the clapper 23, air pressure between the closed end of the cylinder and the piston 62 will alternately build up and fall off as the piston alternately covers and uncovers the exhaust port 64 in reciprocating with the swinging clapper, all in a well known manner.

The separator device thus insures that only clean dry air is supplied to the bell ringing mechanism and provides continuous and trouble free operation thereof under dry and dusty operating conditions and also in freezing weather conditions in which the moisture in the air would freeze and cut off the air supply to the actuating mechanism. The mounting cushions for the bell and bell operating mechanism effectively reduces transmission of sound vibrations from the bell to the locomotive underframe.

I claim:

1. In a bell mechanism, a bell, a bell ringing mechanism including a pneumatic bell ringing cylinder within the bell, an air cleaner for separating and for discharging separated moisture and dirt particles from the air supplied to the cylinder, a nipple interconnecting said bell, cylinder and air cleaner, a mounting bracket and cushion mounting means for resiliently supporting the bell, bell ringing mechanism and air cleaner on the mounting bracket, said air cleaner and bell being secured to said mounting means by said nipple.

2. In a locomotive bell mechanism, a locomotive underframe, a bell, a pneumatic bell ringing mechanism for the bell including a pneumatic bell ringing cylinder, an air cleaner for separating and for discharging separated moisture and dirt from the air supplied the cylinder, a bell mounting bracket secured to the underside of the locomotive underframe and resilient cushion means resiliently supporting the bell, the bell ringing mechanism and the air cleaner on the bell mounting bracket, and a nipple for conducting air from the air cleaner to the cylinder and serving to clamp said air cleaner and bell to said resilient cushion means.

3. In a bell mechanism, a bell having a central upper opening, a pneumatic bell ringer including a cylinder having an air inlet nipple extending vertically upwardly through the opening in the bell, an air cleaner body mounted on the upper end of the nipple, a bell mounting bracket, rubber cushions on the bracket and means cooperating with said nipple for removably connecting bell with the cushions and retaining the cushions compressed, said air cleaner body having upper and lower chambers and a reduced diameter intermediate portion in coaxial relation with the nipple, the upper chamber having a cylindrical wall, the lower chamber having a lower cylindrical side wall portion and an upper side wall portion tapering therefrom toward the neck portion and a bottom wall tapering upwardly from the lower side wall portion to the nipple, a tubular clean air outlet conduit communicating at the lower end with the nipple and extending axially upwardly through the neck portion into the upper chamber and having a small diameter clean air inlet opening in the upper end, the lower chamber also having a port in each of the side wall portions, said ports being disposed in opposite tangential relation and spaced circumferentially apart, the port in the upper tapering wall portion serving as an air pressure inlet port and the port in the lower cylindrical wall portion serving as a discharge port, said discharge port having a diameter substantially equal to the upper clean air opening in the clean air conduit.

4. In a bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device comprising a body having large diameter end chambers and a small diameter neck between the chambers, one chamber having a pair of tangentially, opposite disposed ports in the side, one port being of smaller diameter and located in the wall adjacent the outer end and serving as a discharge port, and the other port serving as an air inlet port and tubular air outlet means connected to the pneumatic cylinder and extending centrally from the outer end of said chamber through the neck portion into the other chamber.

5. In a bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device comprising a body having large diameter end chambers and a small diameter neck between the chambers, one chamber having a pair of tangentially opposite disposed ports in the side, one port being of smaller diameter and located in the wall adjacent the outer end and serving as a discharge port and the other port serving as an air inlet port and tubular air outlet means extending centrally from the outer end of said chamber through the neck portion into the other chamber, the tubular air outlet means having a

reduced diameter entrance and connected at the outer end to the pneumatic cylinder.

6. In a pneumatic bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device having enlarged diameter upper and lower chambers and a small diameter neck portion therebetween, the lower chamber having a tangential air inlet port in the side and a smaller diameter discharge port in the side adjacent the bottom and tubular air outlet means communicating with the cylinder and extending upwardly from the bottom through the neck portion into the upper chamber.

7. In a pneumatic bell ringing mechanism, a pneumatic cylinder and an air cleaning device having enlarged diameter upper and lower chambers and a reduced diameter neck portion therebetween, the lower chamber having a pair of vertically spaced ports extending in opposite tangential relation through the side, the upper port serving as an air inlet port and the lower port being of smaller diameter and serving as a discharge port, and a tubular air outlet connected at the lower end to the cylinder and extending upwardly from the lower end of the body and through the central portion of the neck portion into the upper chamber.

8. In a pneumatic bell ringing mechanism, a pneumatic cylinder and an air cleaning device having enlarged diameter upper and lower chambers and a reduced diameter neck portion therebetween, the lower chamber having a pair of vertically spaced ports extending in opposite tangential relation through the side, the upper port serving as an air inlet port and the lower port being of smaller diameter and serving as a discharge port, and a tubular air outlet extending upwardly from the lower end through the central portion of the neck portion into the upper chamber, the upper end of the tubular outlet having a small diameter air entrance and the lower end communicating with the pneumatic cylinder.

9. In a pneumatic bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device comprising a body having vertically aligned upper and lower chambers of circular cross-section having walls tapering inwardly from the outer ends and forming an intermediate smaller diameter neck portion, said lower chamber having a pair of tangentially opposite disposed ports in the chamber wall, one port being located adjacent the bottom of the lower chamber and serving as a discharge port and the other port being of larger diameter and located upwardly from the bottom and serving as an air inlet port and a tubular air outlet extending coaxially upwardly from the bottom of the lower chamber through the neck portion and into the upper chamber and connected at the lower end to the pneumatic cylinder.

10. In a pneumatic bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device comprising a body having vertically aligned upper and lower chambers of circular cross-section having walls tapering inwardly from the outer ends and forming an intermediate smaller diameter neck portion, said lower chamber having a pair of tangentially opposite disposed ports in the wall, one port being located adjacent the bottom of the lower chamber and serving as a discharge port and the other port being of larger diameter and located upwardly from the bottom and serving as an air inlet port and a tubular clean air outlet extending coaxially upwardly from the bottom of the lower chamber through the neck portion and into the upper chamber, the upper end of the tubular air outlet having a reduced diameter air entrance opening of substantially the same diameter as the discharge port and the lower end of the tubular clean air outlet communicating with the bell ringing cylinder.

11. In a locomotive bell mechanism, a pneumatic bell ringer having a pneumatic cylinder and an air cleaning device having a body, said body having adjacent chambers in alignment and of circular cross-section, the adjacent wall portions of the chambers tapering inwardly to form a reduced diameter neck between the chambers, one chamber having a pair of tangential ports, one port being of smaller diameter and located in the wall adjacent the outer end to serve as a discharge port and the other port being located in the wall inwardly from the outer end and serving as an air inlet port, the ports extending in tangentially opposite directions with respect to the walll and a tubular air outlet connected to and communicating with the cylinder and of smaller diameter than the neck extending centrally from the outer end into the other chamber and having a restricted air entrance opening.

12. In a locomotive bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device therefor having a body, said body having adjacent chambers in alignment and of circular cross-section, the adjacent wall portions of the chambers tapering inwardly to form a reduced diameter neck between the chambers, one chamber having a pair of tangential ports, one port being of smaller diameter and located in the wall adjacent the outer end to serve as a discharge port and the other port being located in the wall inwardly from the outer end and serving as an air inlet port, the ports extending in tangentially opposite directions with respect to the wall and a tubular clean air outlet connected to the pneumatic cylinder and of smaller diameter than the neck extending centrally from the outer end into the other chamber and having a restricted air entrance opening of substantially the same diameter as the discharge port.

13. In a locomotive bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device comprising a body having vertically aligned upper and lower chambers, the adjacent walls of the chambers tapering inwardly from the outer ends and forming a smaller diameter neck between the upper and lower chambers, the lower chamber having an upper air inlet port and a lower discharge port of smaller diameter, the ports being disposed in the wall in tangentially opposite relation, and a tubular clean air outlet extending upwardly from the central portion of the lower end and through the central portion of the neck portion and into the upper chamber, the upper end of the tubular air outlet having a reduced diameter opening of substantially the same diameter as the discharge port and the lower end of the tubular clean air outlet being directly connected to the pneumatic bell ringing cylinder.

14. In a locomotive bell ringing mechanism, a pneumatic bell ringing cylinder and an air cleaning device having a body including vertically aligned chambers of circular cross-section and a reduced diameter neck portion therebetween, the lower chamber serving as a moisture and dirt separating chamber and having a lower cylindrical side wall and upper side wall tapering radially inwardly and upwardly therefrom and

a bottom wall tapering upwardly from the lower side wall to the center, said upper side wall having an air pressure inlet port disposed tangentially therein, the lower side wall having a small diameter discharge port disposed tangentially therein adjacent the bottom wall and in opposite tangential relation to the inlet port, the upper chamber being of cylindrical form and serving as a clean air chamber and a tubular clean air outlet leading from the upper chamber through the neck portion and connected to the central portion

of the bottom wall of the lower chamber and to the pneumatic bell ringing cylinder.

ALBERT L. MACAN.

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