J. O. HARRISON, DEC'D.
E. M. SINCLAIR, ADMINISTRATOR.
AIR BRAKE EXHAUST REDUCER.
APPLICATION FILED JULY 3, 1916.

1,287,007.

Patented Dec. 10, 1918.
2 SHEETS—SHEET 1.

Fig. 1.

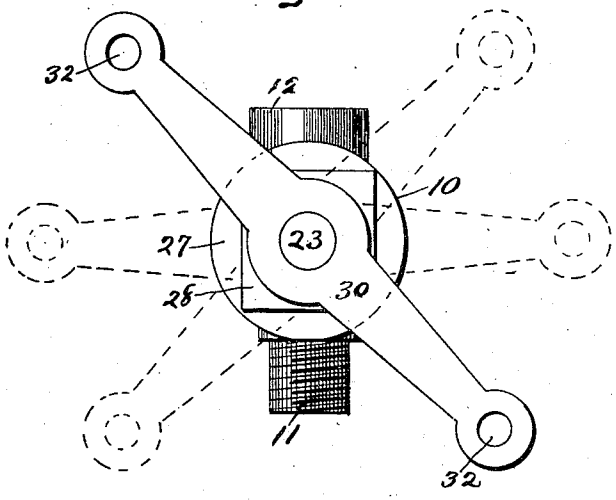


Fig. 4.

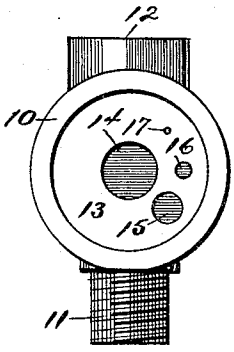


Fig. 2.

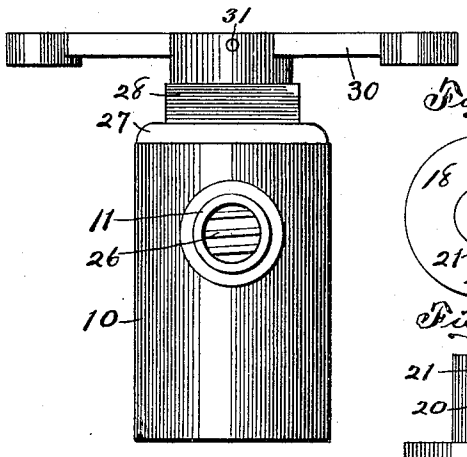


Fig. 5.

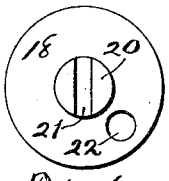


Fig. 6.

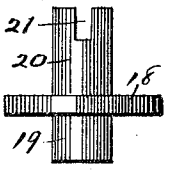
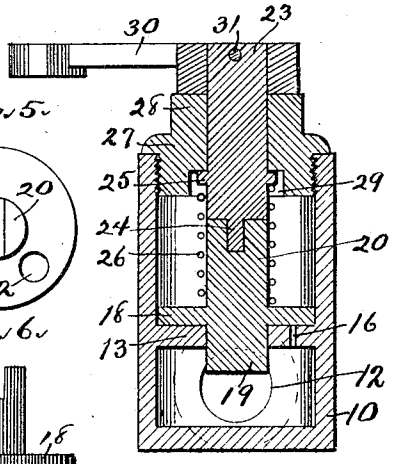


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 7.

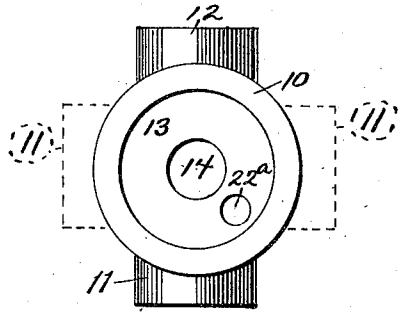


Fig. 8.

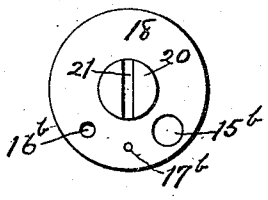


Fig. 11.

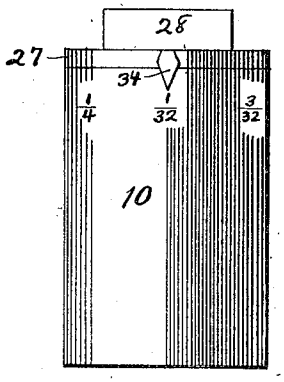


Fig. 12.

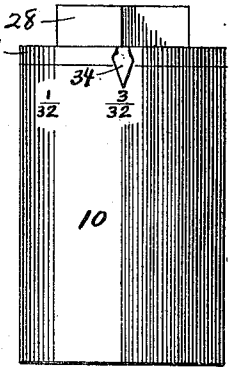


Fig. 9.

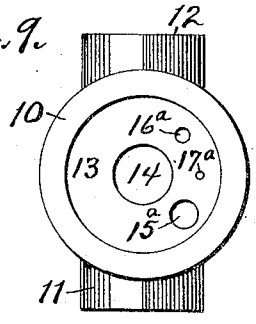
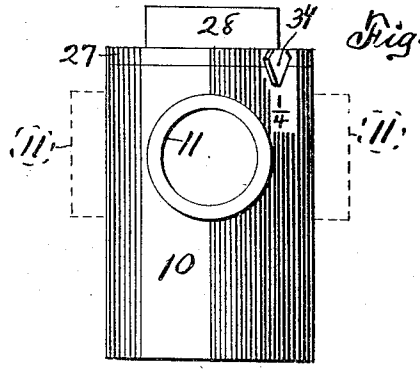


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHN O. HARRISON, OF BOONE, IOWA; EARL M. SINCLAIR ADMINISTRATOR OF SAID JOHN O. HARRISON, DECEASED.

AIR-BRAKE-EXHAUST REDUCER.

1,287,007. Specification of Letters Patent. Patented Dec. 10, 1918.

Application filed July 3, 1916. Serial No. 107,325.

To all whom it may concern.

Be it known that I, JOHN O. HARRISON, citizen of the United States of America, and resident of Boone, Boone county, Iowa, have invented a new and useful Air-Brake-Exhaust Reducer, of which the following is a specification.

The object of this invention is to provide means for obviating and preventing the jerk of released cars on unreleased cars in the use of air-brakes, in respect of the operation of releasing brakes.

A further object of the invention is to provide means for reducing the exhaust of air-brake cylinders just sufficient to retain pressure in front cylinders long enough to enable engineer to release rear brakes first and at the same time allow auxiliary reservoirs to recharge so that the engineer has control of train at all times and under all circumstances.

A further object of this invention is to provide means to keep the brakes applied on head end of train until it is safe to release them without strain on the rear car or cars.

A further object of this invention is to provide means for holding the brakes on the head end of a train until the rear end of said train is free, thus preventing all strain on the rear end of the train.

Another object of this invention is to provide means for correcting the mistaken idea heretofore advanced by air-brake men, that the greater pressure and quicker action nearer the engine and consequent quicker release of the brake nearest the engine causes jerks; as this jerk can only occur beyond the point where the train-line pressure and auxiliary-reservoir pressure equalizes, inasmuch as the time elapsing between the release of the first and second cars is less than the time required to run out the slack between two cars traveling in the same direction at substantially the same speed.

Another object of this invention is to provide means for adjusting the degree of exhaust from an air-brake.

Another object of this invention is to provide means adapted to be applied to any air-brake for controlling the exhaust therefrom and adjusting said exhaust to any desired degree.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a plan of my improved device, the first, or open, position being shown in solid lines, dotted lines being employed to show exhaust-reducing adjustment of the valve. Fig. 2 is a side elevation of the device. Fig. 3 is a central vertical section of the device. Fig. 4 is a plan of the chamber only of the device. Fig. 5 is a plan and Fig. 6 an elevation of the valve employed in the device.

Fig. 7 is a plan of the chamber of the device showing a modified construction. Fig. 8 is a plan of the valve only, showing a modified construction. Fig. 9 is a plan of the chamber only, showing a further modified construction. Fig. 10 is an elevation in diagram of the chamber and cap, showing a modified construction in one position. Figs. 11 and 12 are elevations, in diagram, similar to Fig. 10, showing different positions of the cap relative to the chamber.

In the construction of the device as shown the numeral 10 designates a valve-chamber, which is preferably cylindrical in form and provided with a closed bottom and an open top, the upper end of the chamber being interiorly threaded. The chamber 10 is formed with an inlet port through a port or nipple 11 in the side (and at any circumferential point) and above the center thereof, which port or nipple is adapted for connection with an air-brake (not shown) in any suitable location such as with the exhaust end of a triple-valve or its equivalent employed in said air-brake, so that the port in said port or nipple will afford communication between said triple-valve and the chamber. The valve-chamber 10 also is formed with an exhaust port through a boss 12 in the side thereof, preferably opposite to the port or nipple 11 and near to the lower end of the chamber, which exhaust port may open directly to the atmosphere or be connected to any other device, such as the retainer now in use on some air-brakes. Different circumferential locations of the port or nipple 11 are shown by dotted lines in Figs. 7 and 10. The ports in the nipple 11 and boss 12 and the normal capacity of the chamber do not in any manner or to any de-

gree limit or restrict the exhaust from the air-brake. The valve-chamber 10 is formed with a horizontal partition or valve-seat 13 immediately above the port in the boss 12 and said valve-seat is formed with a central hole 14 forming a bearing. A plurality of holes, in any number (three being shown in this instance), 15, 16 and 17, are formed in the valve-seat 13 in an annular row concentric with the hole 14, and said holes are of various sizes, such as one-fourth inch, three-thirty-seconds inch, and one-thirty-seconds inch diameter respectively. The holes 15, 16 and 17 serve as ports for the passage of air downwardly through the valve-seat 13. A circular valve 18 is mounted on the seat 13 and the contacting faces of said members preferably are fitted, as by grinding, to make a joint between them. A pivot 19 is formed on and extends downwardly from the central portion of the valve 18 and is journaled in the hole 14 in the valve-seat 13. A valve-stem 20 is formed on and extends upwardly from the central portion of the valve 18, in alinement with the pivot 19, and a diametrical slot 21 is formed in the upper end of said stem. A hole or port 22 is formed in the valve 18 in such position as to register at times with the ports 15, 16 or 17 selectively, and said port 22 preferably is of the same diameter as the largest of the other ports. A valve-key 23 is mounted end to end on the valve-stem 20 and is formed with a tenon 24 adapted to engage in the slot 21 of said stem before, during and after seating of the cap hereinafter described. The key 23 also is formed with a circumferential flange 25 within the chamber 10 and an expansive coil spring 26 is mounted around the stem 20 and key and impinges and presses firmly at its opposite ends on the valve 18 and flange 25 respectively. It is the function of the spring 26 to hold the valve 18 seated and to maintain a considerable friction between said valve and its seat and between the key and a retaining device so as to avoid accidental operation of the valve by rotation due to the jarring of the device in use. A cap 27, formed with a nut 28, is screwed into the upper end of the valve-chamber 10 and pressure is applied manually to the cap to compress the spring 26 and permit said screw-seating of the cap. The cap 27 and nut are formed with a central hole adapted to receive and form a bearing for the upper portion of the key 23 and the cap is further formed with an annular recess 29 adapted to receive the flange 25, said cap serving the dual purpose of closing the chamber 10 and preventing outward movement of the key. A cross-head or handle 30 is mounted on the upper end portion of the key 23 and is secured thereto, such as by a pin 31. The cross-head or handle 30 is formed with a hole 32 in each end and operating devices (not shown) may be secured in said holes and extend to opposite sides of the car therefrom for manual actuation for rotary movement of the handle.

The parts are assembled as shown with the ports 15 and 22 normally registering and the cross-head or handle off the dead center so that it can be conveniently operated manually by a push or pull from either side of the car on which it is mounted.

Assuming that all the cars of a train are equipped with these devices, the head brakeman, acting under instructions of the engineer, would set or adjust some of the devices, as on the foremost ten and the next succeeding twenty cars of the train, so as to restrict and limit or reduce the exhaust of the brakes on said cars selectively. For instance, the devices on the first ten cars might be set to register the ports 17 and 22 and the devices on the next succeeding twenty cars might be set to register the ports 16 and 22, the devices on the remaining cars being at normal with the ports 15 and 22 registering. Then, when the engineer releases the brakes, the exhaust from the brakes so adjusted would be reduced, limited, restricted and prolonged in point of time to such extent that the releasing operation or function so initiated by the engineer would be extended almost to a like number of cars to the rear of those so limited. Otherwise, the release operation or function would expire at the end of about thirty cars on account of an equalizing of pressure between the train-line and auxiliary reservoirs, resulting in a jerk tending to open the train, by breaking or pulling a draw-bar, at the point of such equalizing, the weight of the cars released being directly opposed to the resistance of the cars not released. Even though the train is not parted, further operation by the engineer, sometimes repeated to the limit of patience and with much loss of time, power and at much risk of damage, is necessary to effect the release of the brakes on the rear-most car or cars. Sometimes it is impossible to release all the brakes in the time available, with the result that the train enters an upgrade or level stretch of track with little or no speed and dragging rear cars with a great loss of time and power. Readjustment of the reducing devices is effected manually by the head brakeman at the next convenient stop.

Under the usual operation of air-brake systems on freight trains, the exhaust of the first ten cars through the ports 17 and 22 would require about two minutes and twenty seconds, and the exhaust of the next twenty cars through the ports 16 and 22 would require about one minute and seven seconds. In other words, the first ten cars would be held back about two minutes and twenty

seconds and the next twenty cars would be held back one minute and seven seconds, thus giving time for full release of cars at the rear of the first thirty before all of the first ten cars are released.

In Fig. 9 the ports in the partition or valve-seat 13 are re-arranged, the smallest port 17^a being located between the largest port 15^a and the intermediate port 16^a. Under this arrangement the devices on the first ten cars would be adjusted by rotating their valves one-eighth revolution to register ports 22 and 17^a; and the devices on the next twenty cars would be adjusted by rotating their valves one-quarter revolution to register ports 22 and 16^a.

In Figs. 7 and 8 the ports are shown to be rearranged, the port 22^a being formed in the partition or valve-seat 13 and the graduated ports 15^b, 16^b, 17^b being formed in the valve 18. It will be observed that the smallest port 17^b is arranged between the largest port 15^b and intermediate port 16^b. Under the construction of Figs. 7 and 8 the valve 18 carries the graduated ports and is adjusted rotatably, as by a mechanism shown in Figs. 1, 2 and 3, to carry said ports selectively into register with the port 22^a in the valve-seat, such adjustment being on a unit of one-eighth revolution of the valve.

In Figs. 10, 11, 12 indices $\frac{1}{4}$, 1/32, 3/32 are placed in a circumferential row and suitably spaced in respect of one-eighth circumference, on the surface of the chamber 10 and a pointer 34 is formed on the handle 30, and is directed toward one of the indices on the chamber. This arrangement of pointer and indices guide the head brakeman, or other operator, in adjusting the valve 18 to provide the desired degree of reducing the exhaust.

It is to be understood that these devices may be made of any suitable material and in any desired sizes.

It also is to be understood that the number and sizes of ports in the valve and valve-seat may be varied at will.

I do not desire to be understood as limiting myself to the construction and arrangement of parts as shown, since the same may be modified materially without departing from my invention.

This device may be mounted in inverted position, or the handle 30 be placed at the opposite end of the chamber 10 if desired.

I claim as my invention—

1. An air-brake exhaust reducer, comprising a cylindrical chamber formed with inlet and outlet ports, a partition integral with the chamber forming a valve-seat between said ports, said seat being formed with a plurality of ports of various sizes, said ports being respectively one-fourth inch, three-thirty seconds inch, and one-thirty seconds inch in diameter, a disk valve on said seat, said valve being formed with a port as large as the largest port in the seat and adapted to register with the ports in the seat selectively, and means for operating said valve.

2. An air-brake exhaust reducer, comprising a cylindrical chamber having a closed end and formed with inlet and outlet ports in its wall, a partition integral with the chamber forming a valve-seat within and transversely of said chamber between said ports, said seat being formed with a plurality of ports of various sizes, a valve pivoted to said valve-seat and formed with a port adapted to register with the ports in the seat selectively, a cap screwed in the open end of the chamber, said cap being formed with a central hole and with an annular recess at the inner end of and surrounding said hole, a key journaled in said hole, slot and tenon connection between said valve and key, said key being formed with a flange entering said annular recess, an expansive coil spring on said key and valve and impinging said valve and flange, and a cross-head on the outer end of said key.

3. An air-brake exhaust reducer, comprising a cylindrical chamber formed with inlet and outlet ports, a partition integral with said chamber forming a valve-seat between said ports and formed with a plurality of ports of three sizes, the smallest port being located between the other two ports, a disk valve mounted for oscillation in said chamber and formed with a port corresponding in size with the largest port in the seat adapted to register selectively with the ports in the seat, a yielding pressure device acting to seat said valve, and means for operating said valve.

4. An air-brake exhaust reducer, comprising a cylindrical chamber having a closed end and formed with inlet and outlet ports in its wall, a partition integral with said chamber forming a valve-seat between said ports, said seat being formed with transverse ports of three different sizes, a disk valve on said seat and formed with a port adapted to register selectively with the port in the seat, the port in the valve corresponding in size with the largest port in the seat, a cap mounted on one end of the chamber, a key pivoted in the cap and engaging said valve, and a handle on said key.

5. An air-brake exhaust reducer, comprising a cylindrical chamber having a closed end and formed with inlet and outlet ports in its wall, a partition integral with said chamber and forming a valve-seat between said ports, said seat being formed with ports of three different sizes, the smallest port being located between the other two ports, a valve on said seat, said valve being formed with a port adapted to register selectively with the ports in the seat, a stem on said valve, a key detachably engaging said stem,

a nut-cap surrounding said key and secured to one end of said chamber, and means for operating said key.

6. An air-brake exhaust reducer, comprising a cylindrical chamber having a closed end and formed with inlet and outlet ports in its wall, a partition integral with said chamber forming a valve-seat between said ports, a valve on said seat, said seat and valve being formed with ports adapted to register selectively, a stem on said valve, a key detachably engaging said stem, a flange on said key within the chamber, an expansive coil spring on said stem and key, said spring impinging said valve and flange respectively, a nut-cap mounted on one end of the chamber and surrounding said key, said cap engaging said flange on the key, and means for operating said key.

7. An air-brake exhaust reducer, comprising a cylindrical chamber having a closed end and formed with inlet and outlet ports in its wall, a partition integral with said chamber forming a valve-seat between said ports, said seat being formed with transverse ports of three different sizes, a disk valve journaled on said seat and formed with a port adapted to register selectively with the ports in the seat, the port in the valve corresponding in size with the largest port in the seat, a cap mounted on the other end of the chamber, a key pivoted in said cap and engaging said valve, a handle on said key, said chamber being formed with indices showing the diameters of the ports in the seat, and a pointer movable with the valve and stem and adapted to register with said indices.

Signed by me at Des Moines, Iowa, this third day of January, 1916.

JOHN O. HARRISON.

Witnesses:
W. H. WILSON,
S. C. SWEET.

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