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D. T. BARNETT ET AL

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VALVE

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Fig. 1

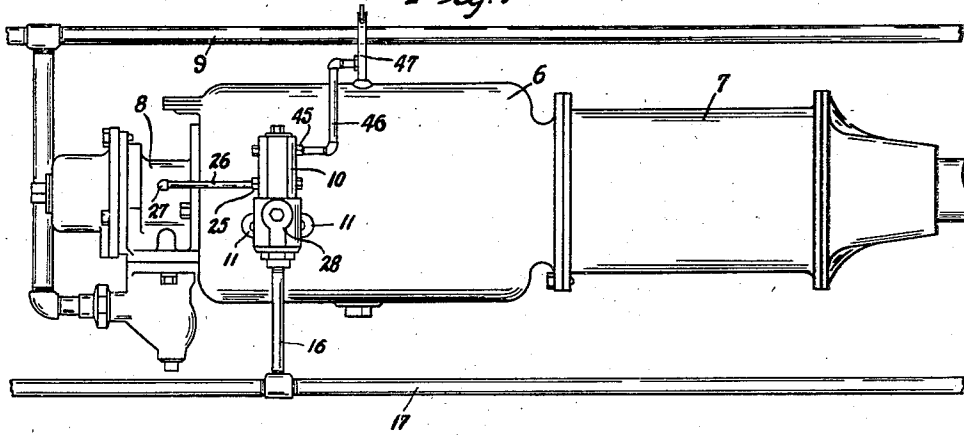


Fig. 2

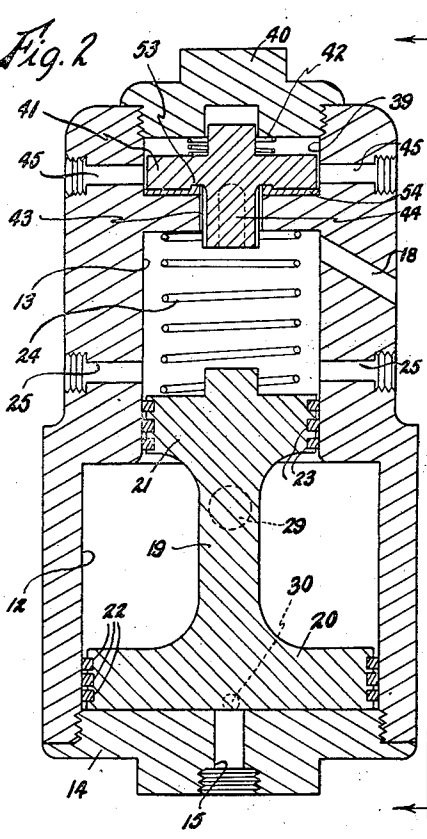
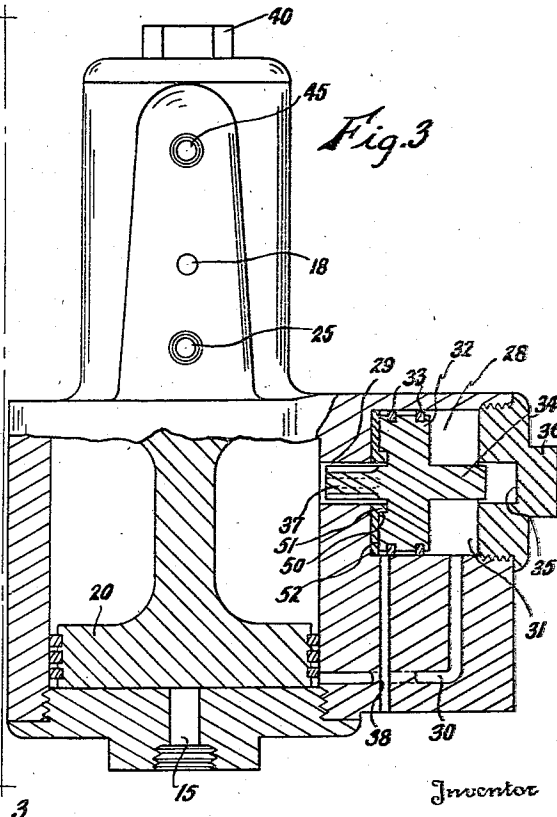


Fig. 3



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VALVE

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14 Claims. (Cl. 303—76)

This invention relates to a valve adapted to be associated with the air brake apparatus on a railway car and to be controlled from the cab for maintaining brake-retaining air pressure in the
5 brake cylinder and for "bleeding" the auxiliary reservoir.

An object of the invention is to provide means whereby the operation of the former retaining valve and bleed cock, which heretofore was necessarily carried out in connection with each individual car of a train, is brought by the means of this invention within the operation and control of the engineer in the cab.

Another object is to provide valve means which permit of instantaneous replenishing of the auxiliary reservoir immediately after each application of the brakes.

Another object is the provision of a valve of the kind indicated which eliminates the delays, improper brake operation, injury to wheels, and to lading and various other disadvantages heretofore connected with the operation of the older type of retaining valve and bleed cock.

Another object is to produce a brake retaining valve in which movement of the valve member is reduced in order to obviate sticking and related improper operation of the valve and resultant damage and danger.

Another object is to produce means of the kind described in a highly efficient and simple manner.

These and other objects are attained by the means described herein and illustrated in the accompanying drawing, in which:

Fig. 1 is an elevational view of an auxiliary reservoir, brake cylinder triple valve and cooperating means, having associated therewith the valve means of the present invention.

Fig. 2 is a cross sectional view taken vertically through the valve of this invention.

Fig. 3 is a view, partly in cross section, taken on line 3—3 of Fig. 2.

Heretofore there has been provided on railroad trains and on each car thereof, a "retaining valve" which was manually operated on each car on each occasion when the train reached a down grade and after the down grade had been passed. This "turning up" and "turning down" of the retaining valve consumed considerable time, especially in trains of some length, and required the services of individuals other than the engineer for operating the valves. This not only entailed delays for the train and the additional services described but likewise the danger of injury to the person operating the valves during wet and slippery weather. The function of the former re-

taining valve, by this invention and its operation, has been placed entirely under the control of the engineer in the cab. This operation consists of nothing more than an application of the air pressure from the main reservoir to the valve of this invention, requiring but an instant's time to be carried out. The other function of the present valve is the emptying or "bleeding" of the auxiliary reservoir when a train has been brought to its terminus, an operation which heretofore has been carried out on each individual car and which now may be performed by a single operation of the valve of this invention.

With reference to the drawing: the portions of the automatic air brake apparatus with which the valve of this invention is directly associated, comprise the auxiliary reservoir 6 having associated therewith the brake cylinder 7 and, on the opposite end, the triple valve 8. The train pipe 9 extends from the main reservoir of air pressure to the triple valve, all of which foregoing parts are well understood in the art. The valve 10 of this invention may be conveniently attached, as at 11, to the auxiliary reservoir casing and the valve itself comprises a body formed to provide a large valve chamber 12 having a second smaller valve chamber 13 communicating therewith. The outer end of chamber 12 may be closed by a suitable cap member 14. The cap member 14 is provided with an entry port 15 through which the chamber 12 communicates, by means of suitable pipe connections 16 and 17, with the main air pressure reservoir associated with the locomotive. The second valve chamber 13 is provided with an exhaust port 18. A valve member 19 comprising a large head 20 and a small head 21 is adapted to operate in the large and small valve chamber, the head 20 in chamber 12 and the head 21 in chamber 13. Suitable rings 22 and 23 may be provided for effecting a snug fit of the valve heads in their chambers. A spring 24 may be positioned in the chamber 13 exerting a light pressure against the upper end of the valve member for normally urging the valve heads to the positions indicated in Fig. 2 wherein the head 20 is shown as closing communication between the chamber 12 and the main reservoir and head 21 closing communication between chambers 12 and 13. The spring 24 is merely for the purpose of keeping the valve member 19 properly seated, however, the spring is not essential since the weight of the valve member normally performs this function and consequently the spring, if desired, may be eliminated.

Chamber 13 is likewise provided with a port 25

which is placed in communication by means of a suitable pipe connection 26 (Fig. 1) with the exhaust port 27 of the triple valve 8. It will be seen that two ports 25 are shown associated with chamber 13. The connection 26 is made on whichever side of the valve body that is convenient to the triple valve and thereafter the other port 25 is suitably plugged.

In Fig. 3 there is detailed an equalizing valve 28 which is associated with the large valve chamber 12 and which communicates therewith by an upper passage 29 and a lower passage 30, the passages communicating with the upper and lower portions respectively of the valve chamber. The chamber 31 of the valve 28 has positioned therein a valve member 32 preferably provided with rings 33 and formed with a stem 34 adapted to seat within recess 35 of a suitable cap member 36, the seat being of a depth less than the length of the stem 34 so that the valve member, in its outward movement, is precluded from covering the mouth of the passage 30. The opposite side of the valve member 32 is formed with a fluted stem 37. The valve member 32 is provided, adjacent the base of the stem 37, with an annular recess 50 adapted to receive the projecting flange 51 of a rubber or composition seat 52 against which the valve member 32 is adapted to abut. It will be seen that the valve member, in the position shown in Fig. 3, covers an exhaust port 38 the function of which will be later described.

The valve of this invention, at the upper end thereof in the position seen herein, is formed to provide a small valve chamber 39 which is closed by a suitable cap 40 and within which a valve member 41, similar to the valve member 32 described, is positioned. A spring 42 normally urges the valve 41 into closed relationship with a port 43 by which chambers 39 and 13 communicate. An annular recess 53 and rubber or composition seat 54, both similar to those heretofore described in connection with valve 32, may be provided. It will be seen that the valve member 41 is formed with a fluted stem 44 which projects slightly into the chamber 13 for a purpose to be later described. Chamber 39 is provided with a pair of inlet ports 45, one of which is plugged and the other of which may be connected by suitable piping 46 (Fig. 1) beneath the bleed cock 47 provided normally at the top of the auxiliary reservoir 6. By these means, the interior of the chamber 39 and the auxiliary reservoir are constantly in communication. It is obvious that the inlet connection into auxiliary reservoir 6 may be made at some other point than at the bleed cock 47. However, it is convenient, in installing the device of this invention, to make use of the bleed cock provided on air brake apparatus now in use.

The valve means of this invention are adapted to be operated in the following manner. The usual application of brakes is made by the engineer. If there is no need of retaining pressure in the brake cylinder after the application of the brakes, the pressure in the cylinder is simply released, in the usual way, into the triple valve, whence it proceeds into the chamber 13 through the port 25 of the present valve, and from chamber 13 the exhaust air escapes to the atmosphere through the port 18. If it is desired, however, to maintain a brake-retaining pressure in the brake cylinder, then, after the engineer has made the usual application of brakes, air pressure sufficient for the brake retaining function is introduced through pipes 17 and 16 into the port 15 of the present valve, it being understood that

there are provided in the engine cab a suitable operating valve and gauge associated with the pipe 17. The brake retaining pressure thus applied raises valve member 19 so that head 20, moving upwardly, uncovers passage 30 whereby said pressure enters valve chamber 31 and is exerted against the rear of valve member 32, as seen in Fig. 3. Simultaneously with the foregoing, the valve head 21 has been moved up above port 25 in chamber 13. The engineer, after thus "setting" the valve of this invention, returns his regular brake valve handle to "running" position which permits air pressure to exhaust from brake cylinder 7 and to pass through triple valve exhaust port 27 into port 25 of the present valve. Head 21 being raised, as described, said exhaust air passes down through chamber 13 into chamber 12, that is, into the space between the two heads 20 and 21, and is exerted through upper passage 29, against the inner side of equalizing valve member 32. When the air pressure concentrated in this manner exceeds the brake retaining air pressure exerted at the rear of valve member 32, the latter is actuated outwardly by the pressure of said exhaust air, so that the exhaust port 38 of valve 28 is opened and the exhaust air pressure, in excess of the brake retaining pressure, is permitted to escape until said two pressures are equalized and the valve member 32 returned to the position seen in Fig. 3. No matter how many times the brakes are operated, the pressure in the brake cylinder is always maintained constant by the use of the valve means just described so that the auxiliary reservoir 6 may always be immediately replenished after each brake application. Moreover, it will be noted that exhaust air, no matter how great its pressure, does not actuate the valve member 19 in any way, since the pressure is exerted against both the valve heads and since the smaller equalizing valve, being subject both to exhaust and to main reservoir pressure, immediately operates to equalize said two pressures. Thus frictional wear and the possibility of sticking of the valve members which, in the older type valves were constant factors to be considered, are minimized in the valve of the present invention.

When a train has reached its terminal and it is desired to bleed the auxiliary reservoir of the cars, it is merely necessary to place the automatic brake valve handle on "lap", then the operating handle for the valve of the present invention is moved to full application position, allowing main reservoir pressure to actuate the valve member 19 upwardly and forcibly against the lower end of the stem 44 of the valve 42 (Fig. 2), overcoming the auxiliary reservoir pressure operative upon valve member 41 and raising said valve member so that the pressure in the auxiliary reservoir flows downwardly into the chamber 13 and escapes through the exhaust port 18. A cut-out valve (not shown) to be used when certain cars of a train are "cut out", may, in accordance with well known practice, be associated with pipe 17 at both ends of each car.

Various other advantages may be mentioned in connection with the use of the valve of this invention in addition to the saving of time and effort in the operation of the former retaining valves and the bleeding of the auxiliary reservoirs 70 in the yards. In connection with these advantages it should be remembered that the air pressure utilized in connection with the means of this invention, is applied and released in reverse order; that is, the pressure when applied proceeds

through the first car and in regular order through the succeeding cars of the train but, when released, the pressure exhausts from the last car, forward. Among the beneficial results may be mentioned the elimination of "flat-slid" wheels on cars; the pulling off of brake rigging; the elimination of slack in long trains; the elimination of rough and jerking stops; the elimination of sticking brakes; the precluding of injury to lading by breaking loose of the bracing.

Modifications suggest themselves upon consideration of the means herein disclosed, such as the incorporation of the present valve means in the body of the triple valve, and various obvious structural changes. Such modifications, however, are believed to be comprised within the spirit and scope of the present invention.

What is claimed is:

1. A valve adapted to cooperate with a railway air brake system and to be associated one each with the brake apparatus on each car of a train, said valve comprising a chamber communicating with the exhaust port of the triple valve of the brake apparatus to receive exhaust air from the brake cylinder after release of the brakes, said chamber being provided with an exhaust port for normally releasing said exhaust air, means operable from the cab for controlling said communication, means associated with the chamber for releasing said exhaust air in excess of a predetermined pressure, and a bleed valve selectively operable by said communication-controlling means and associated with the auxiliary reservoir for exhausting said reservoir.

2. A valve adapted to cooperate with a railway air brake system and to be associated one each with the brake apparatus on each car of a train, said valve comprising a chamber having an exhaust port therein and means for effecting communication between the chamber and the exhaust port of the triple valve of said apparatus whereby exhaust air from the brake cylinder may be directed into and normally exhausted from said chamber, a valve member associated with said chamber and controlling said communication, means for actuating the valve member by air pressure from the main reservoir, an equalizing valve associated with said chamber and adapted to release exhaust air pressure in excess of main reservoir pressure in said chamber, and a valve for bleeding the auxiliary reservoir of the brake apparatus and comprising a chamber adapted to communicate with said reservoir, and a valve member in said chamber and adapted to be selectively actuated by said first valve member for directing auxiliary air pressure through the bleed valve chamber and out of the exhaust port of said first chamber.

3. A valve adapted to be associated with the air brake apparatus on a railway car and to be controlled from the cab for retaining predetermined air pressures in the brake cylinder and for "bleeding" or releasing pressure from the auxiliary reservoir, said valve comprising a body formed to provide a valve chamber communicating with the main reservoir of the air brake system, a second valve chamber communicating with the first chamber and with the exhaust port of the triple valve of the associated brake apparatus, said second chamber having an exhaust port therein, exhaust air from the brake cylinder normally escaping through said port, a valve member comprising two heads operable one each in one of said chambers, one head normally closing communication of the first chamber with the

main reservoir, the other head normally closing communication between the two chambers, air pressure from the main reservoir being adapted to actuate the valve member to effect entry of air from the triple valve exhaust port into said first chamber, an equalizing valve associated with said first chamber for releasing exhaust air in excess of the pressure operative from the main reservoir whereby brake-retaining pressure may be maintained in the brake cylinder, and a bleed valve associated with said second chamber and communicating with the auxiliary reservoir, said valve being actuated by the valve head of the second chamber when a greater than auxiliary reservoir pressure is made operative upon said head, actuation of said valve being adapted to open communication between the auxiliary reservoir and the exhaust port of said second chamber for "bleeding" said reservoir.

4. A valve adapted to be associated with the air brake apparatus on a railway car and to be controlled from the cab for maintaining brake-retaining air pressure in the brake cylinder and for "bleeding" the auxiliary reservoir, said valve comprising a body formed to provide a valve chamber communicating with the main reservoir of the brake system, a second valve chamber communicating with the first chamber and with the exhaust port of the triple valve of the associated brake apparatus, said second chamber having an exhaust port therein, exhaust air from the brake cylinder normally escaping through said port, a valve member comprising two heads operable one each in one of said chambers, one head normally closing communication of the first chamber with the main reservoir, the other head normally closing communication between said two chambers, air pressure from the main reservoir being adapted to actuate the valve member and effect entry of air from the triple valve exhaust port into said first chamber, an equalizing valve associated with the first chamber and communicating by an upper and a lower passage with the upper and lower portions respectively of said first chamber, said first valve head upon actuation of the valve member being moved to a position intermediate said passages whereby the equalizing valve is subjected to air pressure both from the main reservoir and from the brake cylinder, the equalizing valve being provided with an exhaust port for releasing air from the brake cylinder of a pressure greater than the main reservoir pressure operative upon the equalizing valve, and a bleed valve associated with said second chamber and communicating with the auxiliary reservoir, said valve being actuated by the valve head of the second chamber when a greater than auxiliary reservoir pressure is made operative upon said head, actuation of said valve being adapted to open communication between the auxiliary reservoir and the exhaust port of said second chamber for "bleeding" said reservoir.

5. A valve adapted to be associated with air brake apparatus on a railway car and to be controlled from the cab for retaining predetermined air pressures in brake cylinder, said valve comprising a body formed to provide a valve chamber and means effecting communication thereof with the main reservoir of the air brake system, a second valve chamber communicating with the first chamber, means effecting communication of said second chamber with the exhaust outlet of the triple valve of the associated brake apparatus, said second chamber having an exhaust port therein for normally releasing exhaust

air from the brake cylinder, a valve member comprising two heads operable one each in one of said chambers, one head normally closing communication of the first chamber with the main reservoir, the other head normally closing communication between said two chambers, air pressure from the main reservoir being adapted to actuate the valve member to effect entry of exhaust air from the triple valve into the space between said two heads, and an equalizing valve associated with said first chamber for releasing exhaust air in excess of the pressure operative from the main reservoir whereby a predetermined brake-retaining pressure may be maintained in the brake cylinder.

6. A valve adapted to be associated with air brake apparatus on a railway car and to be controlled from the cab for retaining predetermined air pressures in the brake cylinder, said valve comprising a body formed to provide a valve chamber and means effecting communication thereof with the main reservoir of the air brake system, a second valve chamber communicating with the first chamber, means effecting communication of said second chamber with the exhaust outlet of the triple valve of the associated brake apparatus, said second chamber having an exhaust port therein for normally releasing exhaust air from the brake cylinder, a valve member comprising two heads operable one each in one of said chambers, one head normally closing communication of the first chamber with the main reservoir, the other head normally closing communication between said two chambers, air pressure from the main reservoir being adapted to actuate the valve member to effect entry of exhaust air from the triple valve into the space between said two heads, and an equalizing valve associated with the first chamber and communicating by an upper and a lower passage with the upper and lower portions respectively of said first chamber, said first valve head, upon actuation of said valve member, being moved to a position intermediate the inner ends of said passages whereby the equalizing valve is subjected to air pressure both from the main reservoir and from the brake cylinder, the equalizing valve being provided with an exhaust port for releasing air from the brake cylinder of a pressure greater than the main reservoir pressure operative upon the equalizing valve.

7. A valve adapted to cooperate with railway car brake apparatus and comprising a chambered body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus, a valve member vertically reciprocable in the body and comprising two spaced heads, means for introducing main reservoir air pressure into the bottom of said body against the lower valve head to raise the upper head above said inlet port whereby exhaust air is introduced into the body between said heads, and an equalizing valve associated with the lower part of said body and subject both to main reservoir air pressure and to exhaust air pressure for equalizing said pressures in the body without movement of said valve member.

8. A valve adapted to cooperate with railway car brake apparatus and comprising a chambered body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus, a valve member reciprocable in the body and provided with two heads, means for exerting air pressure from the

main reservoir against one of said heads to move the other head past said port whereby exhaust air is introduced into the body between said heads, and an equalizing valve associated with said body and subject both to the main reservoir and the exhaust pressures in said body for equalizing said pressures without movement of said valve member.

9. A valve adapted to cooperate with railway car brake apparatus and comprising a chambered body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus, said body being likewise provided with an exhaust port for normally releasing the exhaust air introduced thereinto, a valve member reciprocable in the body and provided with two heads, means for exerting air pressure from the main reservoir against one of said heads to move the other head past said port whereby exhaust air is introduced into the body between said heads, and an equalizing valve associated with said body and subject both to the main reservoir and the exhaust pressures in said body for equalizing said pressures without movement of said valve member.

10. A valve adapted to cooperate with railway car brake apparatus and comprising a chambered body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus and provided likewise with an outlet port normally releasing exhaust air from said cylinder, a valve member reciprocable in the body and provided with two spaced heads, means for exerting air pressure from the main reservoir against one of said heads to move the other head past said inlet port whereby exhaust air is introduced into the space between said heads, and means associated with said body and releasing therefrom exhaust pressure in excess of a predetermined main reservoir pressure exerted against the valve member.

11. A valve adapted to cooperate with railway car brake apparatus and comprising a chambered body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus and provided likewise with an outlet port normally releasing exhaust air from said cylinder, a valve member reciprocable in the body and provided with two spaced heads, means for exerting air pressure from the main reservoir against one of said heads to move the other head past said inlet port whereby exhaust air is introduced into the space between said heads, and means associated with said body and releasing therefrom exhaust pressure in excess of a predetermined main reservoir pressure exerted against the valve member, said releasing means obviating movement of the valve member in effecting release of the exhaust air.

12. A brake retaining and release valve mechanism adapted to cooperate with railway car brake apparatus and comprising a valve communicating with the exhaust outlet of the triple valve of such apparatus for receiving exhaust air and with the main air pressure reservoir, means associated with the valve for equalizing exhaust and main reservoir pressure in the valve, and means selectively operable by the valve for exhausting the auxiliary air reservoir associated with the brake cylinder.

13. A valve adapted to cooperate with railway car brake apparatus and comprising a chambered body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus and provided likewise with an outlet port normally releasing exhaust air from said

cylinder, a valve member reciprocable in the body and provided with two spaced heads, means for exerting air pressure from the main reservoir against one of said heads to move the other head
5 past said inlet port whereby exhaust air is introduced into the space between said heads, means associated with said body and releasing therefrom exhaust pressure in excess of a predetermined main reservoir pressure exerted
10 against the valve member, and means selectively operable by said valve member for exhausting the auxiliary air reservoir associated with the brake cylinder.

14. A valve adapted to cooperate with railway
15 car brake apparatus and comprising a chambered

body provided with an inlet port communicating with the exhaust outlet of the triple valve of such apparatus for receiving exhaust air therefrom, a valve member reciprocable in the body and provided with two spaced heads, means for exerting
5 air pressure from the main reservoir against one of said heads to move the other head past said inlet port whereby exhaust air is introduced into the space between said heads, and means associated with said body and releasing therefrom exhaust pressure in excess of a predetermined main
10 reservoir pressure exerted against the valve member.

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