

(No Model.) 2 Sheets—Sheet 1.  
S. J. HAYES, H. SCHLACKS & G. F. STARKWEATHER.

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No. 254,872.

Patented Mar. 14, 1882.



**Inventors**  
Samuel J. Hayes  
Henry Schlacks  
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Their Attys

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THROTTLE VALVE FOR LOCOMOTIVES.

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Fig. 4.

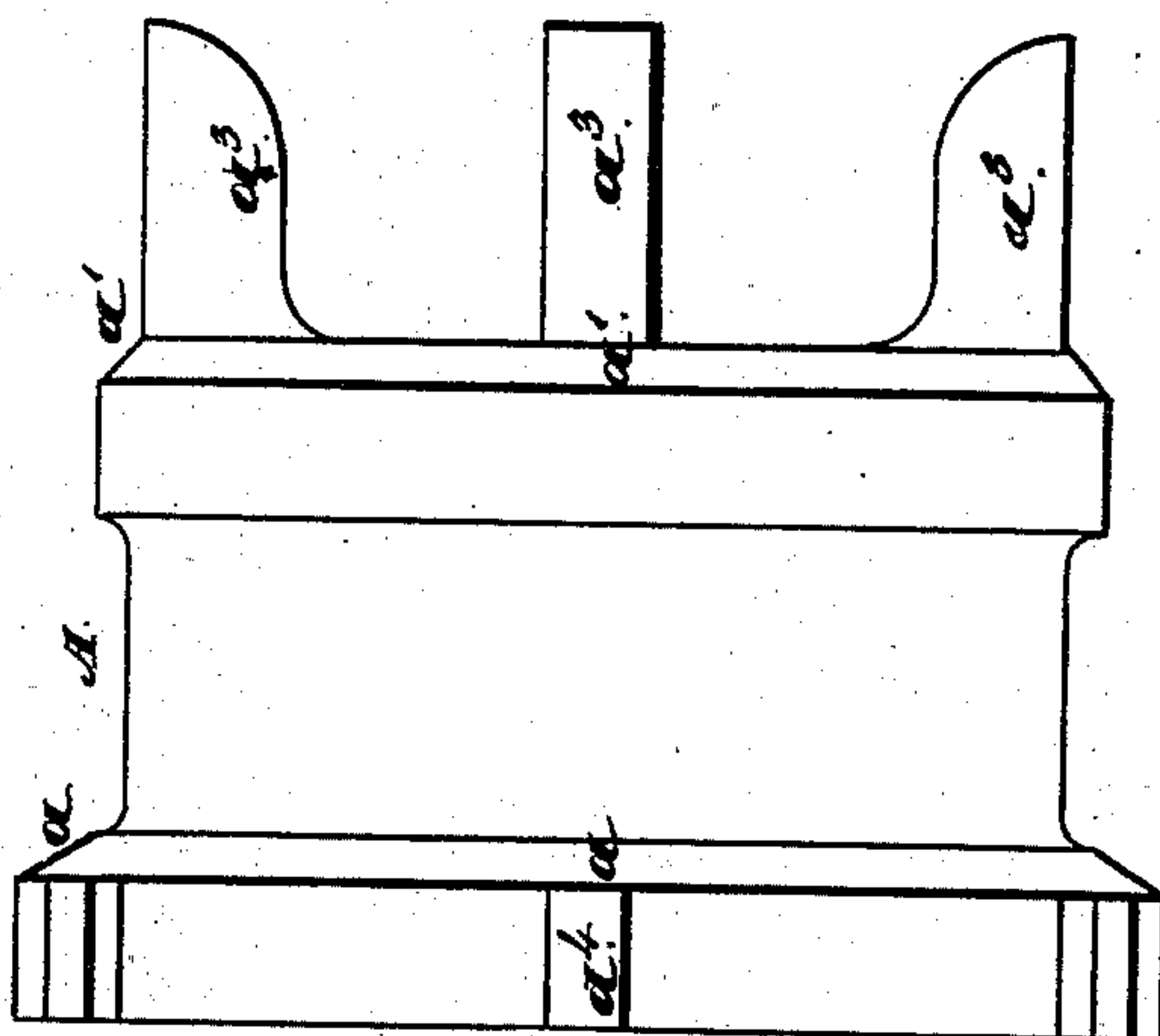
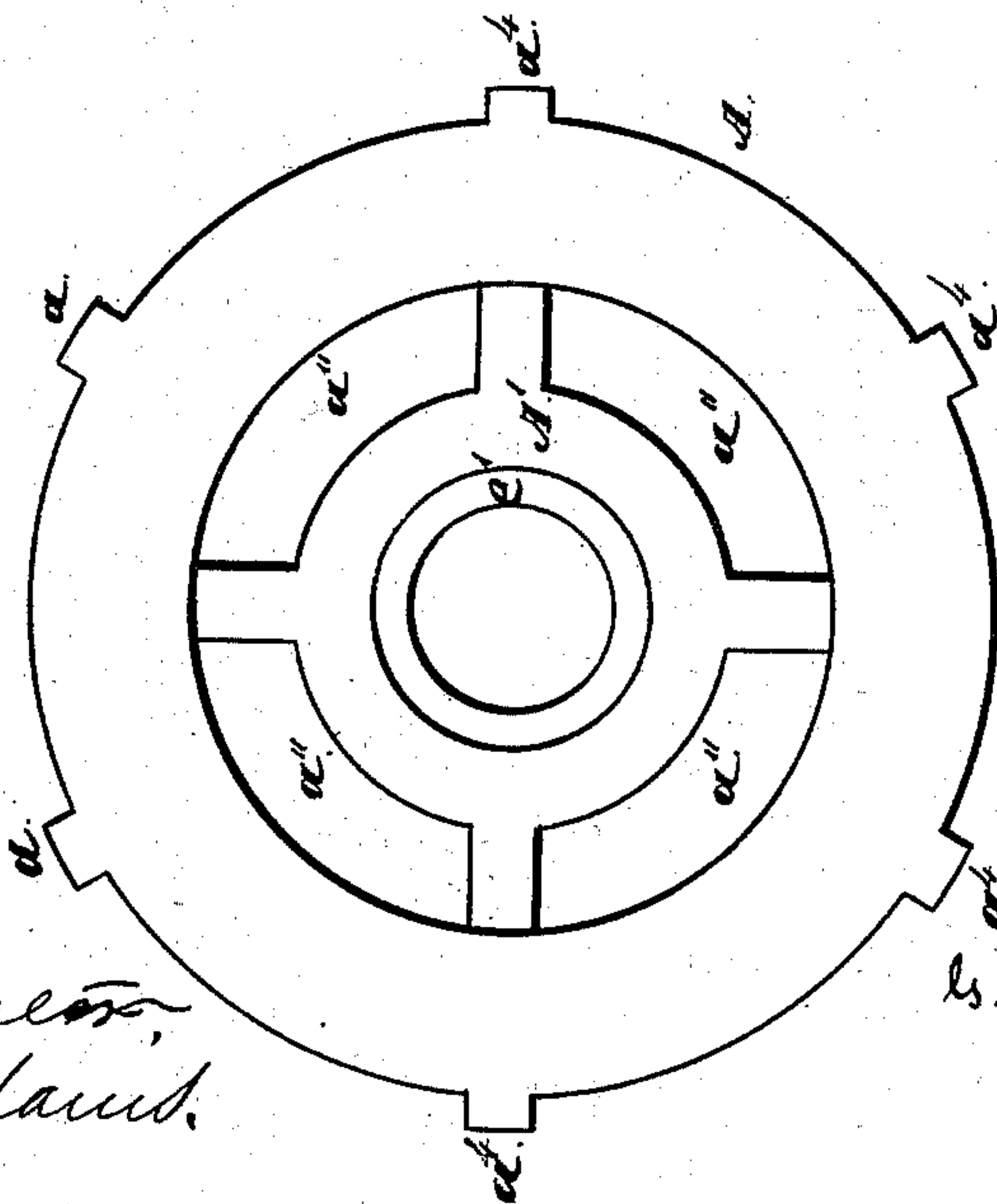


Fig. 3.



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# UNITED STATES PATENT OFFICE.

SAMUEL J. HAYES, HENRY SCHLACKS, AND G. FILLMORE STARKWEATHER,  
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## THROTTLE-VALVE FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 254,872, dated March 14, 1882.

Application filed September 5, 1881. (No model.)

*To all whom it may concern:*

Be it known that we, SAMUEL J. HAYES, HENRY SCHLACKS, and G. FILLMORE STARKWEATHER, residing at Chicago, in the county of Cook and State of Illinois, and citizens of the United States, have invented new and useful Improvements in Throttle-Valves for Locomotives, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical transverse section on line *x x* of Fig. 2, showing a portion of the smoke-arch, boiler-shell, flue-sheet, and flues of a locomotive, with the throttle-valve and its box in section; Fig. 2, a detail, being a longitudinal section of a portion of the smoke-arch, boiler-shell, flue-sheet, and flues, dry-pipe and its attachments to the flue-sheet, and throttle-box with the valve-rod in elevation, and the valve-box and cover, valve, and its attachment to the rod in section; Fig. 3, a detail enlarged, being a front end elevation of the valve; Fig. 4, a detail enlarged, being a side elevation of the valve.

This invention relates to throttle-valves primarily designed for use with locomotive-engines, and has for its objects to facilitate the removal of the valve for grinding or repairing or renewing in case the valve becomes worn out; to increase the working qualities of the valve by rendering it more easily operated both in opening and closing, and when closed have it held more firmly and strongly to its seat; to give the valve a direct connection with its stem or rod, so that it can be operated in a direct line from the cab without any intervening connection or levers; and to render its movements more positive and quicker in proportion to its size than the throttle-valves now in general use, all of which features add greatly to the reliability and usefulness of the valve. These objects we attain by means of the devices illustrated in the annexed drawings.

In the drawings, A represents the exterior portion of the valve; A', the interior portion of the valve; B, the valve-box; B', the flanges or ears on the valve-box, for attachment to the steam-pipes; B'', the flange on the rear end of the valve-box, for attachment to the dry-pipe;

C, the cover of the valve-box; D, the bridge or support for the front or outer seat, *b*; E, the steam-passage leading to the steam-pipes; F, the valve stem or rod; G, the dry-pipe; H, the sleeve or collar for attaching the dry-pipe to its ring or seat; I, the ring or seat supporting the front end of the dry-pipe; J, the adjusting-ring for making the connection between the valve-box and the end of the dry-pipe; K, the flue-sheet; L, the flues; M, the boiler-shell; N, the smoke-arch; *a*, the front valve-seat; *a'*, the rear valve-seat; *a''*, the steam-passages through the valve; *a*<sup>3</sup>, the rear guide flanges or wings; *a*<sup>4</sup>, the front guide flanges or wings; *b*, the front seat of the valve-box; *b'*, the rear seat of the valve-box; *c*, the steam-passage between the front and rear seats of the valve and between the exterior face of the valve and the interior face of the box; *d*, the steam space or chamber between the cover C and the front of the valve; *e*, the half-boxes or dies forming one portion of the connection of the valve stem or rod with the valve; *e'*, the shoulder of the center A against which the end of *e* abuts; *f*, the head or ball on the end of the valve stem or rod; *g*, the nut for locking the head *f* in position.

The smoke-arch M, boiler-shell N, flues L, flue-sheet K, ring or seat I, sleeve or collar H, and dry-pipe G are constructed and arranged in any of the usual and ordinary forms for such parts in locomotives now in general use, and these parts are not carried out in detail in the drawings, nor are they specifically herein described, as they form no essential part of this invention, except in their relation to the throttle-valve and its devices. The steam-pipes are not shown at all, but are of the usual construction and arrangement in locomotive-engines. The valve stem or rod F passes through the dry-pipe, and is attached the throttle-lever, located in the cab of the engine, as usual, and the end of the dry-pipe is connected with the flue-sheet by the ring or seat I and collar or sleeve H in the usual manner of connecting such parts.

The valve A is made of a single piece of material, cast or otherwise formed, so as to have a central core or portion, A', and an exterior ring or portion, A, united by arms or



connections, so as to leave openings or passages  $a''$ , leading from the rear to the front end of the valve, through the body thereof. The exterior of face A is provided at its front end with a seat,  $a$ , and at its rear end with a seat,  $a'$ , the seat  $a$  being of a larger diameter than the seat  $a'$ , and between these seats, on the exterior face of the valve, is a groove or opening forming a steam-passage,  $c$ , between the valve and its box, the balance of such opening or passage  $c$  being formed in the interior face of the box, as shown in Figs. 1 and 2. Extending back or out from the rear end of the valve are wings or flanges  $a^3$ , which form guides, and on the exterior of the front portion of A, forward of the seat  $a$ , are other wings or flanges,  $a^4$ . These wings or flanges  $a^3$   $a^4$  form guides to hold the valve in position in its box, and reduce the frictional contact between the surfaces of the valve and its box, so that the valve has a freer and easier movement. The core or central portion,  $A'$ , of the valve is provided with a central longitudinal opening, the forward portion of which is larger than the rear portion, so as to form a shoulder,  $e'$ . The forward portion of this opening receives the half-boxes or dies  $e$ , each of which is provided with openings, which, when the boxes are together, form a semi-spherical opening, with a circular opening leading therefrom through the boxes or dies. The semi-spherical opening in these half boxes or dies receives the head  $f$  of the valve stem or rod F, and this rod or stem F, between its body and its head or ball portion  $f$ , is cut away, so as to form a neck of smaller diameter than the diameter of the ball or the stem, which portion, when the parts are together, lies in the opening formed in the half-boxes back of the semi-spherical opening and permits of a slight movement of the valve on the stem or rod, so that its seats will conform and be in contact and act to effectually close the seats when the valve is closed. The opening in the socket or central portion,  $A'$ , at the front thereof, is screw-threaded to receive a nut,  $g$ , in the end of which is a semi-spherical opening corresponding to the opening in the half-boxes or dies, so that when the nut is screwed down to place the half-boxes and the end of the valve stem or rod will be securely held in position. By this arrangement the valve will be connected with its stem, so that it is free to move to the extent required to seat it properly, and at the same time the connection is one by which the valve can be operated through the valve stem or rod. Other forms of connection than the half-boxes or dies  $e$  and the nut  $g$  and the head or ball  $f$  can be used for attaching the valve to its stem, the connection shown and described being one which permits the valve to move slightly, so as to seat properly, but not being the only one which can be used.

The box B may be cast or otherwise formed in shape to have an interior adapted to receive the valve, such interior having a front seat,  $b$ ,

and a rear seat,  $b'$ , coinciding with and conforming to the shape of the seats  $a$   $a'$ , so that when the valve is closed the seats will act to prevent the escape of steam, as usual, an opening or passage being formed in the face of the box between the seats to form, in conjunction with the opening between the seats of the valve, the steam opening or passage  $c$ . The opening in the front of the box corresponds in diameter to the diameter of the valve with the wings  $a^4$  added, and this opening between the front of the valve and the face of the cover C forms a steam space or chamber,  $d$ , into which the steam passes from the dry-pipe through the openings or passages  $a''$ . The front of the valve is closed by means of a cover, C, which can be secured thereto by means of bolts or otherwise, so as to be readily removed, the face of the cover and the face of the box forming a tight joint when the parts are together.

The exterior of the box B may be of any desired shape adapted for attachment to the flue-sheet and steam-pipes, and it may be so formed as to take the place of other forms of boxes for throttle-valves located in the smoke-arch at the end of the dry-pipe, so that such boxes and the valves which they carry can be taken out and the box B with its valve be used in place thereof. As shown, the lower portion of the exterior face, at the front end of the box, is provided with ears  $B'$ , by means of which the box is attached to the steam-pipes, and the rear portion of the box, on its exterior, is provided with a flange,  $B''$ , by means of which and suitable bolts the box is attached to the flue-sheet; and, as shown, in order to make the connection between the flue-sheet and the box a perfect one, an adjusting-ring, J, is provided, by means of which any irregularities can be taken up, one face of the ring being formed to coincide with the face of the sleeve or collar H and the other being formed to fit snugly against the end of the box, as shown in Fig. 2. Other forms of connection for the box with the flue-sheet and dry-pipe than that shown may be used so long as such connection will produce the requisite fitting of the parts.

As shown, the outer front seat,  $b$ , is supported on the under side by a bridge or wall, D, cast or formed with the box, and, if desired, one or more of such walls or bridges may be used, or such bridges or walls may be dispensed with when the seat is formed sufficiently heavy to resist the pressure when the valve is closed. The lower portion of the box below the valve is provided with an opening or passage, E, leading to the steam-pipes, as usual, and into this passage the steam opening or passage  $c$  around the valve leads, so that steam will pass from  $c$  into E, and thence to the steam-pipes.

When it is desired to remove the valve for grinding or repairs, or to replace it by a new valve in case it becomes worn out, all that is necessary to be done is to remove the cover C, unscrew the nut  $g$ , and project the end  $f$  of the



valve stem or rod beyond the end of the valve sufficiently far to permit the removal of the half-boxes or dies *e*, when the valve can be readily slipped from the stem or rod, and be ground or otherwise repaired or replaced by a new valve, and after the valve has been ground or repaired, or in case a new one is used, it is replaced in position by inserting the half-boxes on the head *f*, drawing the valve rod or stem F back and screwing the nut *g* down to place, and replacing the cover C, when the valve is again ready for use. By this arrangement it will be seen that the valve can be readily removed for any purpose or replaced by a new valve, and that such removal and replacement are effected without disturbing any of the connections of the valve-box with the flue-sheet, dry-pipe, or steam-pipe, so that it is not necessary to break any of the steam joints or connections in removing the valve or replacing it, by which means a large amount of labor is saved, and less time is required in fixing, repairing, or replacing the valve.

In use a forward movement of the rod or stem F opens the valve by means of its connection through such forward movement, carrying the valve forward and raising the seats *a a* from the seats *b b'* and opening the valve, and this opening of the valve permits the steam from the dry-pipe G to pass directly through the opening between the seats *a' b'*, and also through the opening between the seats *a b* from the space or chamber *d*, into which the steam passes through the openings *a''*, bringing the steam which passes through both sets of seats *a b* and *a' b'* into the opening or passage *c*, from which it passes into the opening or space E into the steam-pipes, from which pipes it passes to the cylinder in the usual manner. The backward movement of the rod or stem F carries with it the valve and closes the seats *a a'* and *b b'* and prevents the passage of steam through such seats into the passage or opening *c*; but at the same time the steam is free to pass through the openings *a''* into the opening or space *d* in front of the valve, and act against the front face of the valve, and assist in holding the valve firmly onto its seats, and this operation is greatly increased by reason of the increased surface presented by the seat *a* over the seat *a'*. By this construction and arrangement of the valve-box, valve, and stem or rod it will be seen that the valve has a direct connection with its stem or rod, and that all intermediate levers and connections are dispensed with, simplifying the construction and rendering the operation more readily and easily accomplished. The valve lies in a horizontal position, with its larger end forward

and the box correspondingly arranged, so that by removing the cover the valve can be easily and quickly taken out. By having the larger seat in front and steam-passages leading there-to through the valve from the dry-pipe the steam can be brought into action to assist in closing the valve and holding it closed. The steam-passages also permit the steam to pass from the dry-pipe to the front of the valve, and thence to the steam-passage leading to the steam-pipes through the front seats, when the valve is opened, thereby permitting the passage of steam to the steam-pipes through both the front and rear seats. The valve can be located in close proximity to the cylinders, so that the steam can be shut off quickly, avoiding waste and the working of a large amount of steam through the cylinders before the engine feels the throttle. The form of the valve and its box is such that to remove the valve it is not necessary to break any of the fittings or joints, and the connection of the valve with its stem by a loose joint permits the valve to balance itself so as to seat properly at all times and under all circumstances, all of which features when combined produce the best results and render the valve very efficient and effective in operation.

What I claim as new, and desire to secure by Letters Patent, is—

1. A throttle-valve having its body provided with openings or passages leading from its rear to its front face, and loosely connected to a valve stem or rod by a ball on the end of the rod fitted within the half-boxes *e* of the valve, and a box adapted to receive the valve and to be attached in the smoke-arch at the end of the dry-pipe, and provided with interior valve-seats, steam space or chamber in front of the valve, and a steam-passage leading to the steam-pipes, in combination with a valve stem or rod and a dry-pipe, substantially as and for the purposes specified.

2. The combination, with the valve-box B, having seats on its inner face, of the valve A, provided with exterior seats and steam-passages *a''* and with a central opening, the half-boxes *e*, fitted in the central opening of the valve and having a recess receiving a ball, *f*, upon the end of the valve-rod F, and the nut *g*, said members being constructed and arranged for operation substantially as described.

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